

DXCC Honor Roll #1 Antenna Strategies



Rich Holoch, KY6R

Why DXCC?

- A great way to test your mettle – in building your station and improving your operating skills
- A great way to learn about building antennas, geography and propagation
- It's a “competition” where you compete with yourself
- It's a great way to retain interest in ham radio and staying on the air
- It has a lot of lore and a certain mystique no other operating activity has



This Presentation Will Cover:

- Antenna choices and construction hints and tips
- Antenna modeling tools
 - EZNEC (by W7EL) and Moxgen (by AC6LA)
 - Model each antenna and all antennas together (as a system)
 - YW (by N6BV)
 - For mono band yagi antennas
 - HFTA (by N6BV) and “antenna.13” (by K6TU)
 - One degree fans let you play HFTA and K6TU HFSweep
- Propagation prediction tools
 - K6TU propagation service
 - VOACAP + HFTA + Low Band Predictions
 - N6BV Propagation Charts – see all signals in one place
 - N6BT – Array of Light – many hints and tips
 - DX ATLAS
 - Grey line knowledge is a must
- VK0EK Analysis

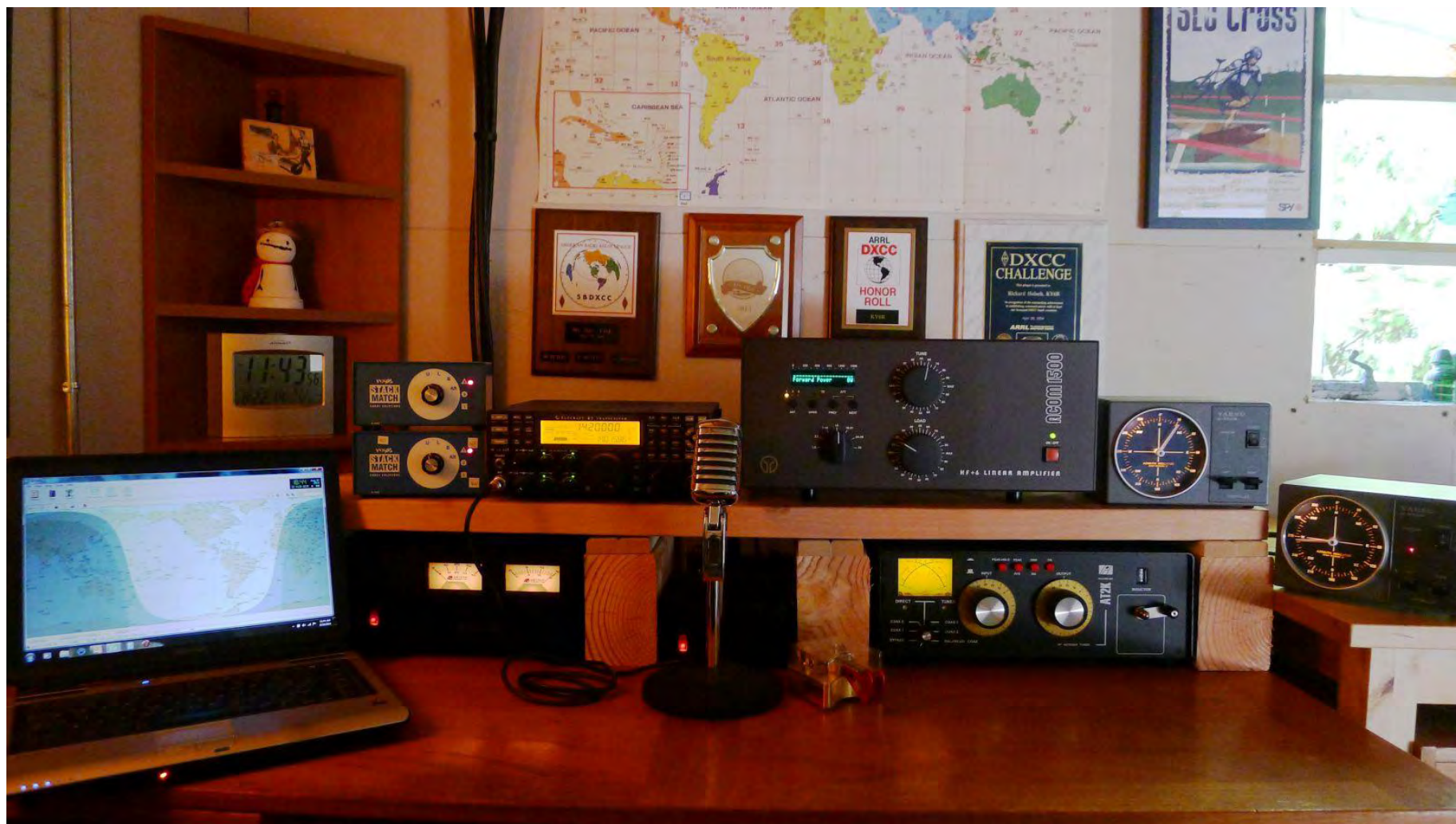
KY6R - Career

- Graduated University of Pennsylvania, Lock Haven - B.S Computer Science
- 33 years in the database sector as a Database Administrator and Programmer
- 127th employee at Oracle, 30th at Gupta Technologies, very early at PeopleSoft
- Currently Director of Technical Support at startup Splice Machine in San Francisco

KY6R – Amateur Radio

- SWL at age 11 in 1971 – built Heathkit SW-717
- WN2QHN - age 13 in Newton, NJ in 1973
- WA2QHN – age 15 – 1975 (worked @ LRE!)
- Off the air from 1977 until July 2001, but became KY6R passing the Advanced and Extra at the Sunnyvale VEC in 1991. Tried to get back on the air then – built a bunch of QRP radios, but no go
- July 2001 – started DX-ing
- 2004 – made 8BDXCC, 1500 Challenge
- January 1, 2013 – made DXCC Honor Roll
- January 1, 2020 – DXCC Honor Roll #1 (???????)

KY6R - Shack

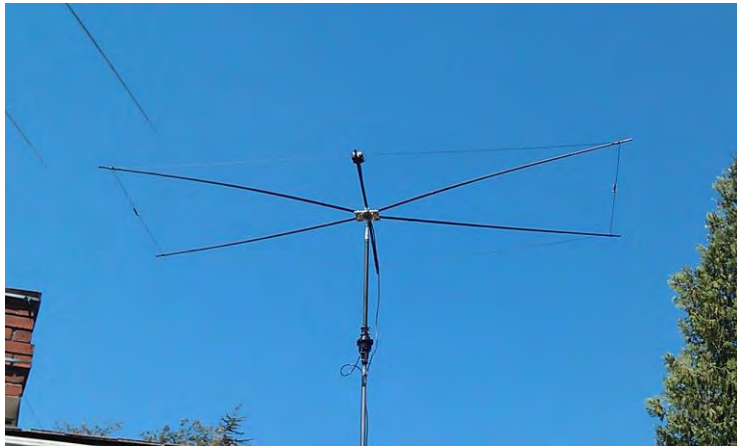


Elecraft K3 and KX3 (not shown), ACOM 1500, Palstar AT2K, Array Solutions Rat Pack and Stack Match II, Yaesu Rotators, Astron Linear Power Supplies, Begali Key, Ten Tec Regal Mic

KY6R Antennas – All Homebrewed



Full sized 3L 20M Monobander up 55'



15M Moxon up 30'

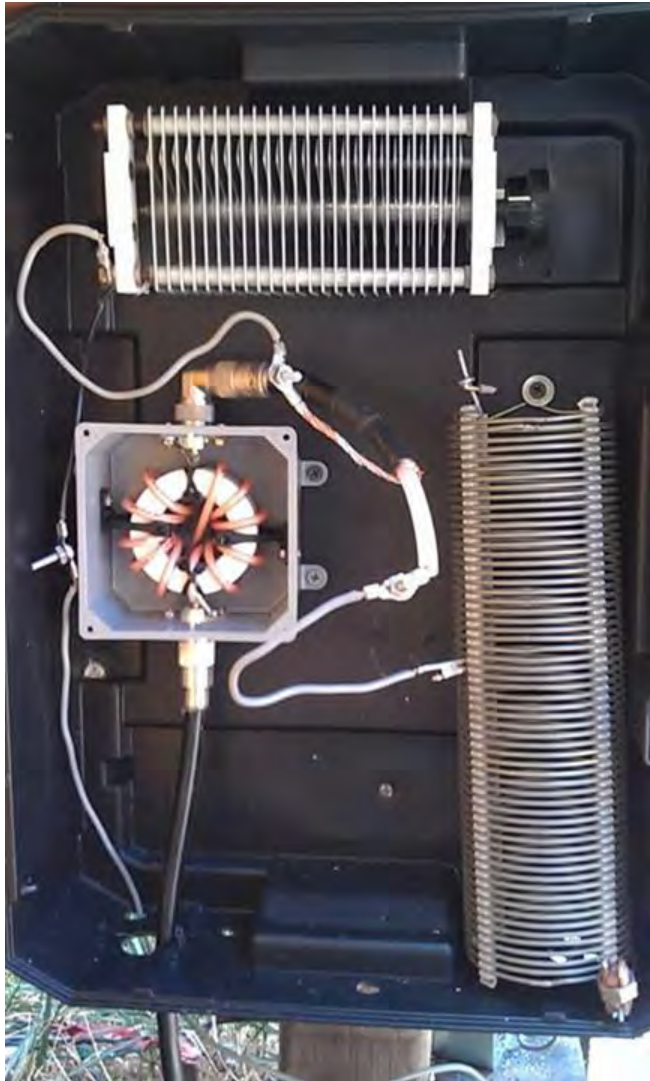


Phased 40M Vertical Array



Short top loaded 160/80M

Antenna Matching



160/80M with short hatted vertical

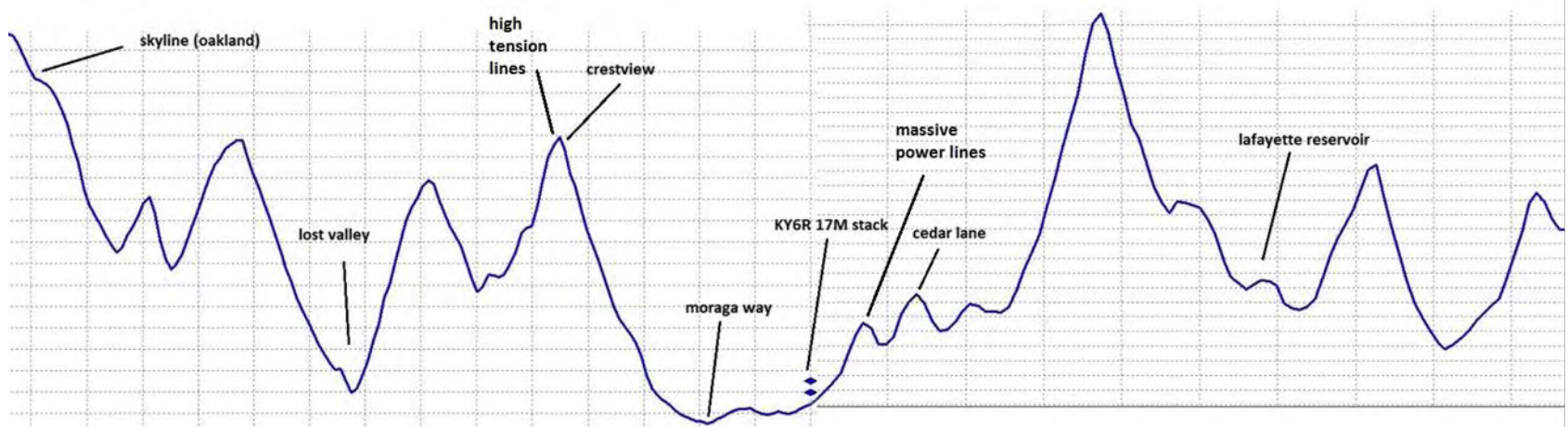


30M on 40M phased vertical array, and can use 3L
20M yagi or 15M Moxon as rotatable dipole
on 17, 12 and 10M

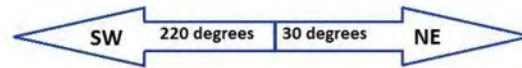


KY6R Site





Shunts signals below 11 degrees



Shunts signals below 18 degrees



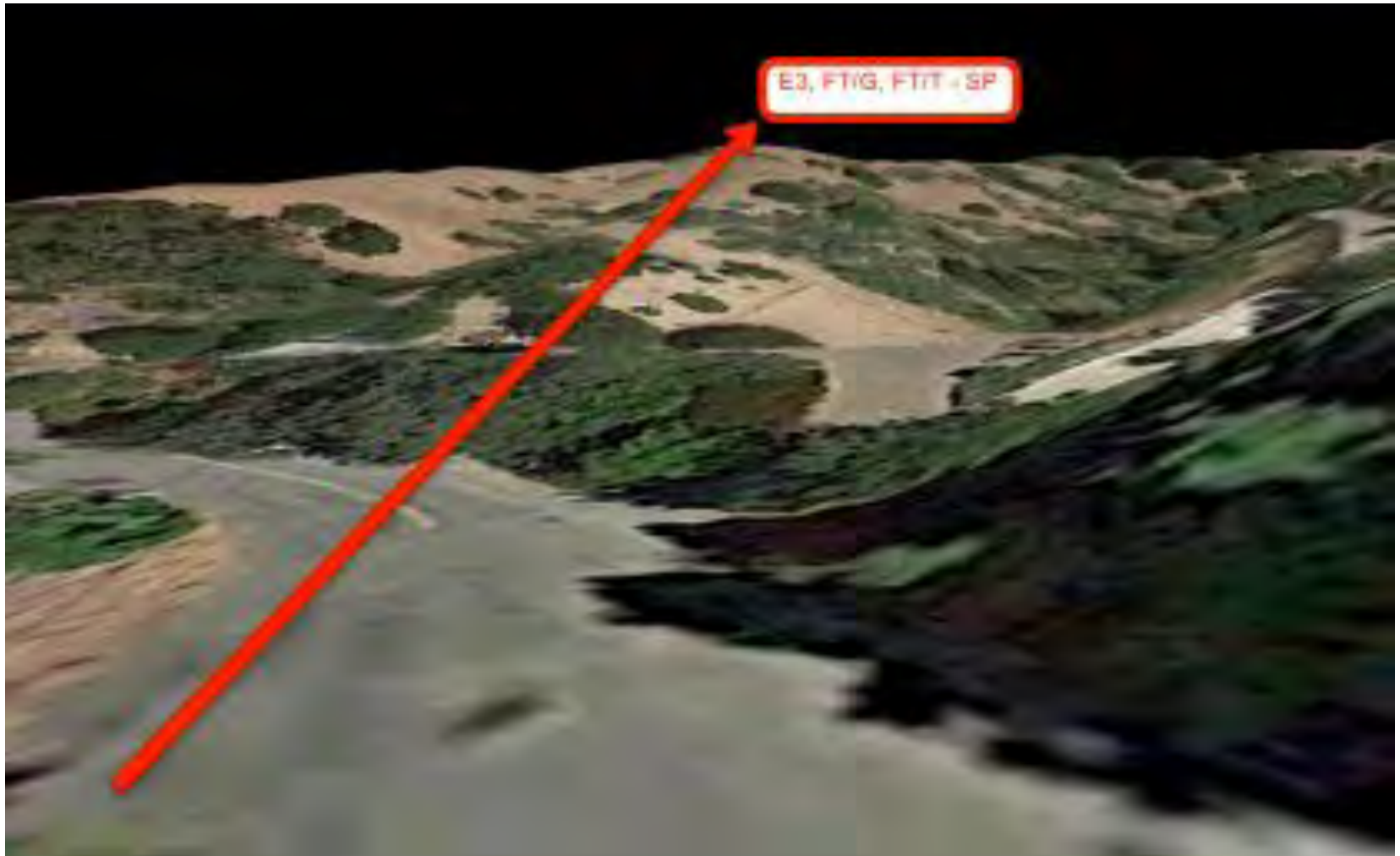
Looking Down From FT5ZM



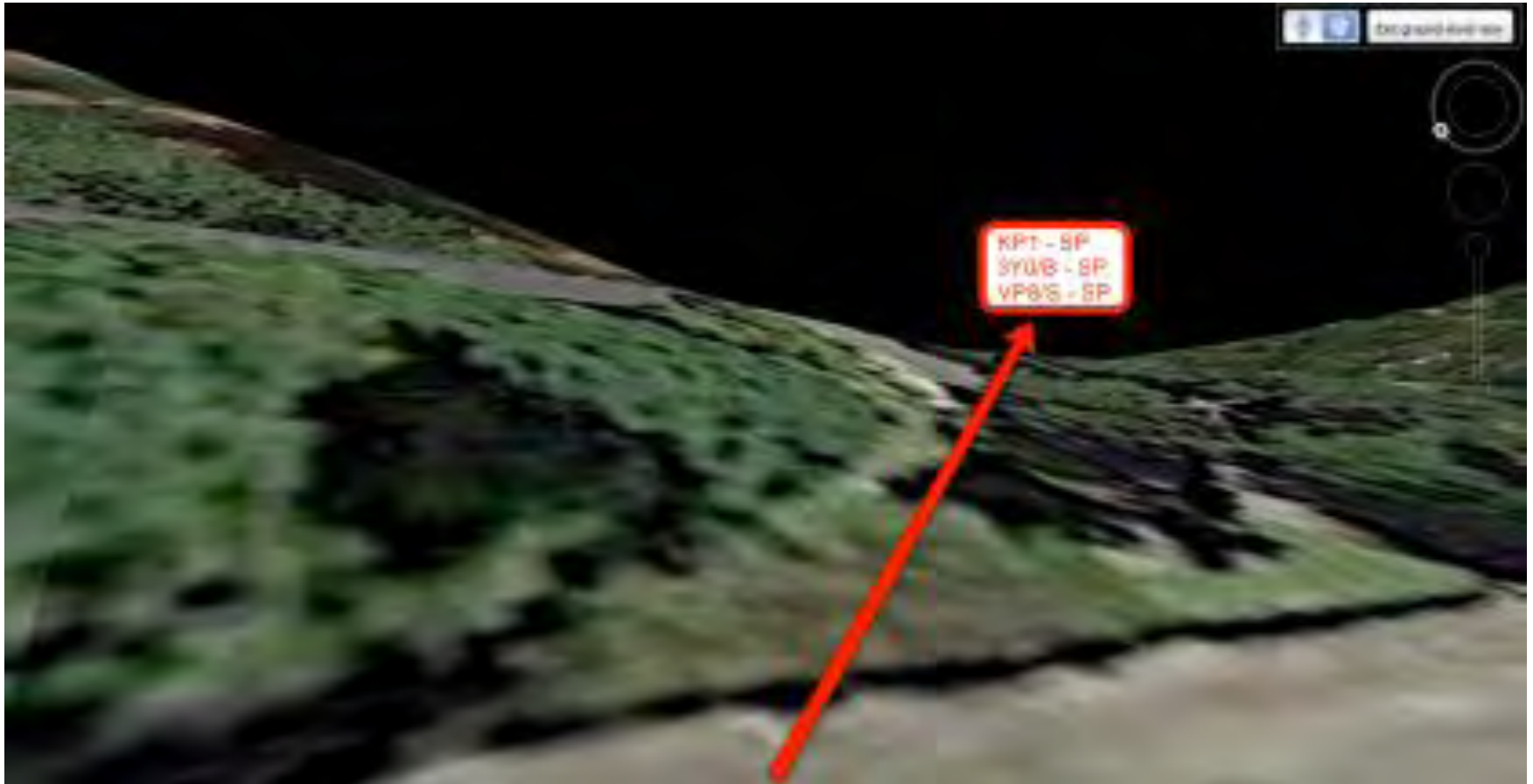
FT5ZM



FT/T, FT/G and E3



KP1, 3Y0/B and VP8/S



All Directions



Three Important Rules

- If you can increase your gain by 2 dB and / or drop your TOA by 2 degrees, then you will open up a new layer of DX
- Make sure not to inadvertently cause negative interaction by placing too many antennas too close to one another – model all antennas together
- An amplifier won't help you hear the DX any better

The “Agile” Guide to DX-ing . .

1. Model

2. Build and Test

3. Work DX

Proven Strategy (Details)

(which I used to go from 325 to Honor Roll in one year – 2012)

1. State your “ambitious but *realistic*” goal(s)
2. Analyze your site with HFTA for your needs and what is planned in the next few years
3. Study propagation predictions for the announced DX-peditions
4. Use DX Atlas to understand the grey line(s)
5. Build antennas that give you the highest probability that you will work that “new one”
6. Add power ONLY after improving your antennas
7. Jump in the pileups with a new found, hands on confidence that you WILL work them!

Lets Use FT/T as a “Case Study”

- Lets walk through the Proven Strategy – all 7 steps
- This is not theory, this is reality – a pro-active way to increase the probability that you will snag that next big ATNO
- You will use some modeling to then get out in that back yard and get your hands dirty

1. First Goal: DXCC Honor Roll #1 by 2020

November
2014
This one
Is ON!

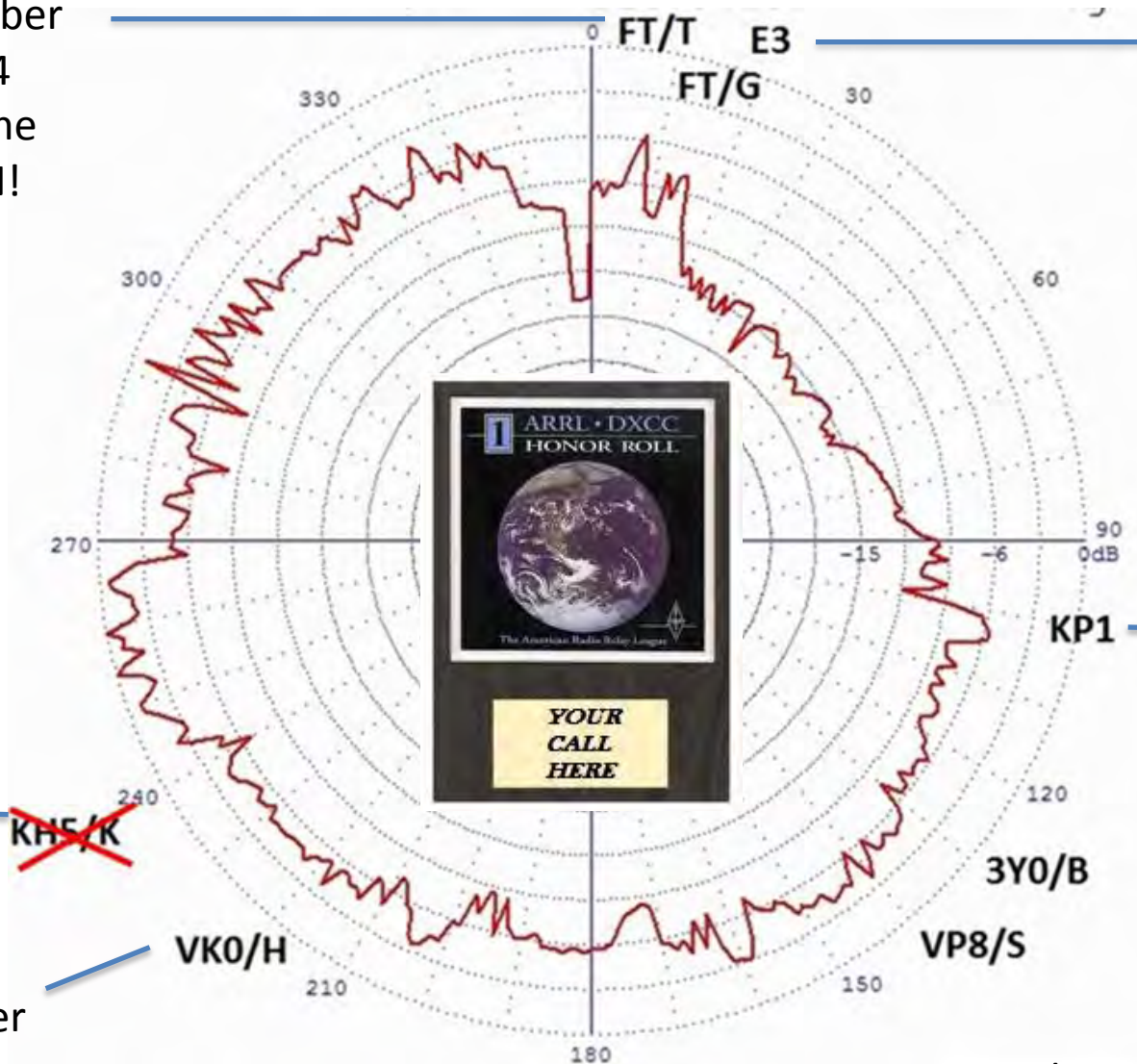
September
2014
Only a
“preliminary”
trip there.

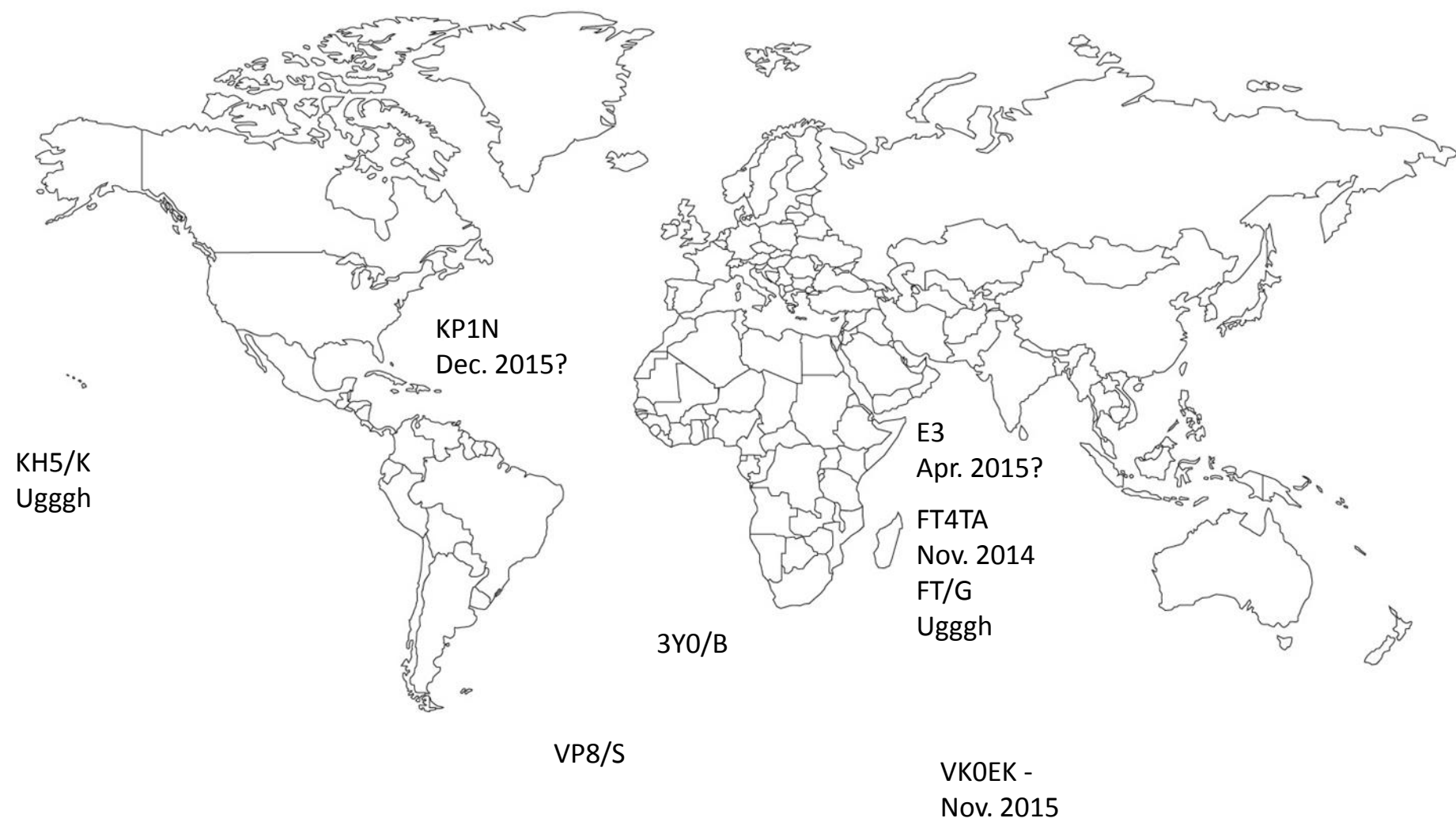
Not
counting
On it

2015
w/in
18
months

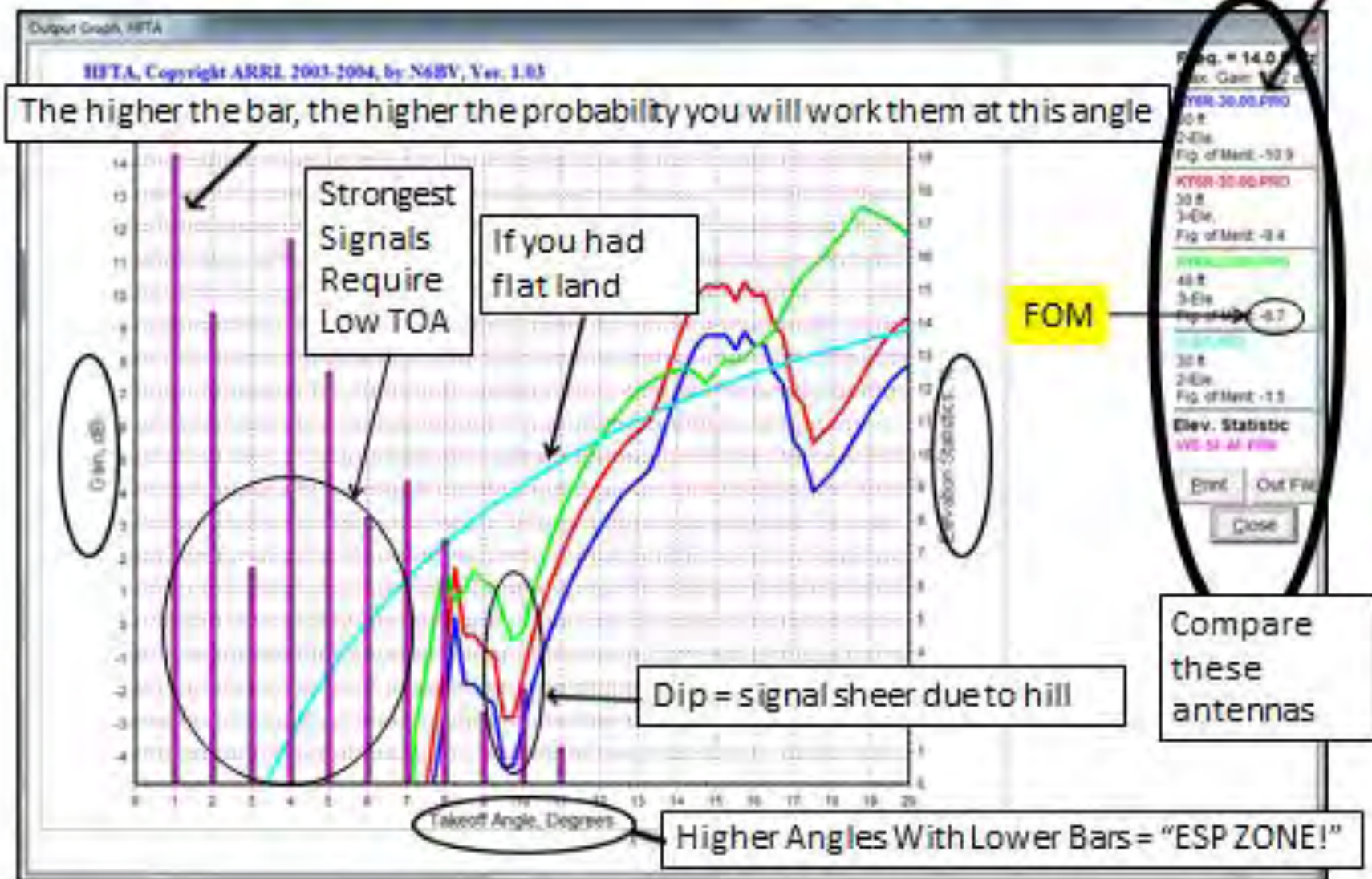
November
2015

Others being planned!



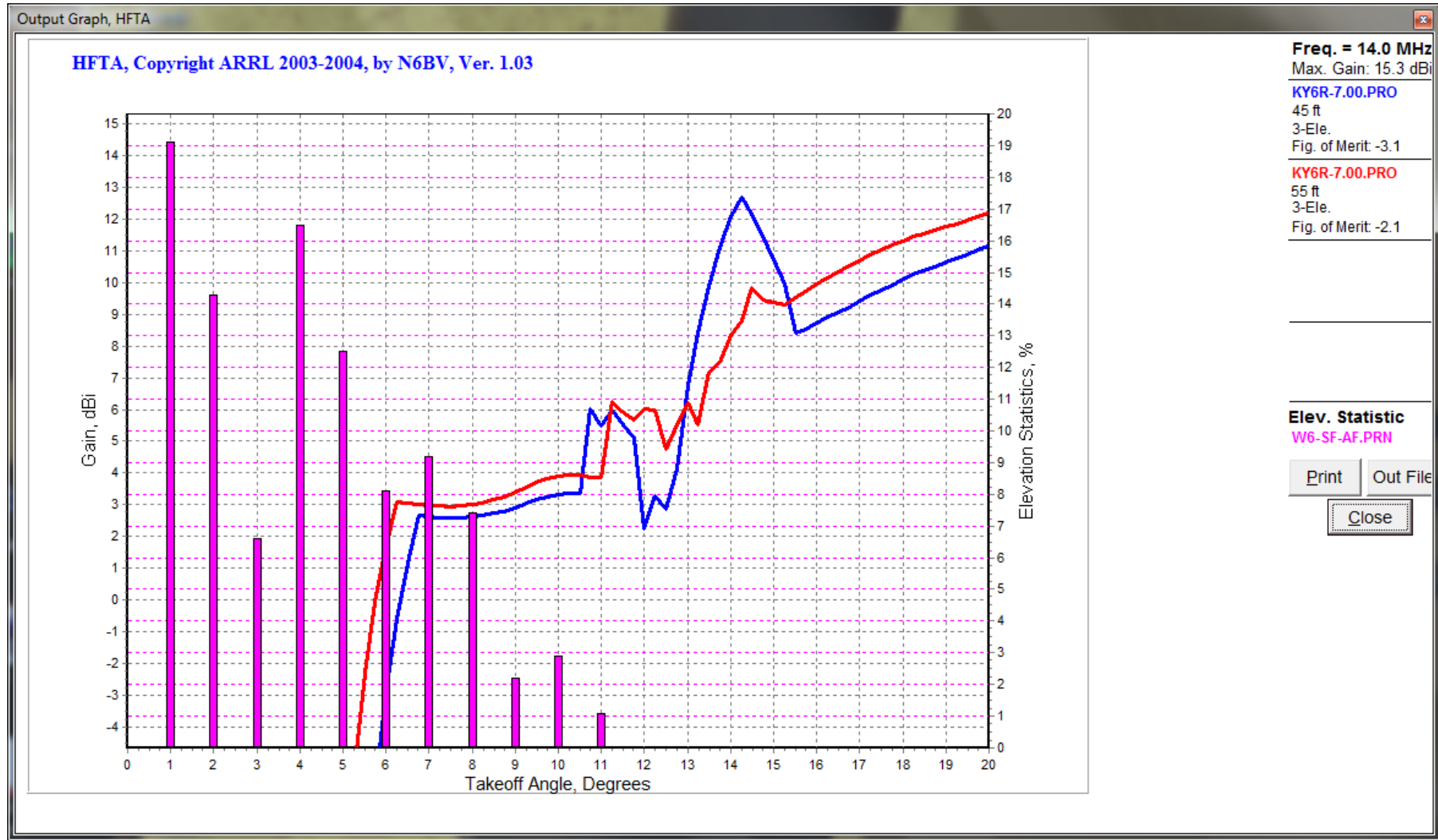


How to Read an HFTA Chart



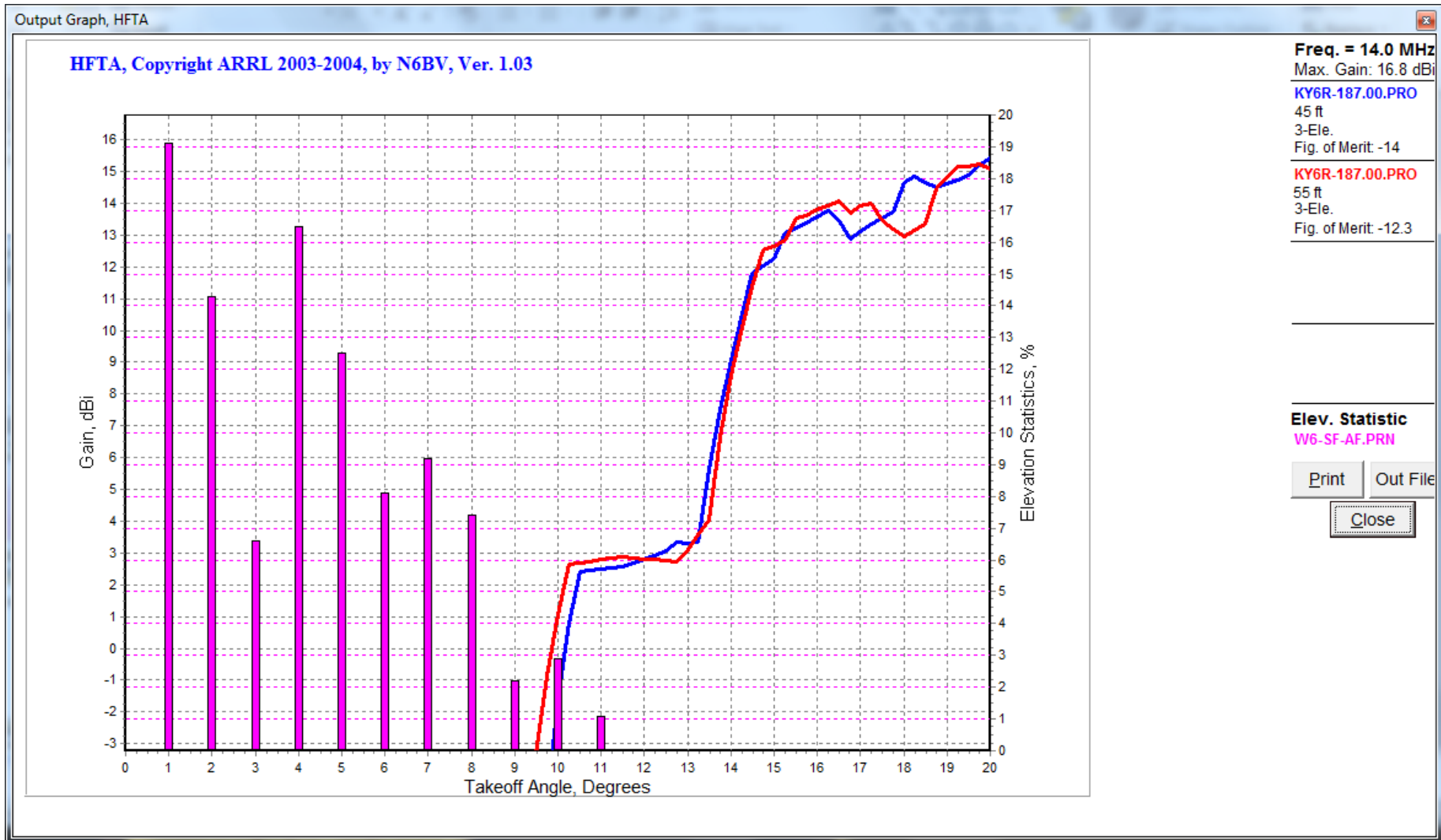
HFTA does not handle verticals – only horizontal antennas, but can “fake it”

2. KY6R – FT/T - 7 Degrees on 20M



I use an AB-577 military mast as my tower. I found 2 more 5' sections, and raising my yagi 10' will improve my ability to work E3, FT/T and FT/G in the SP by 1 dB

And here is 187 degrees for the LP

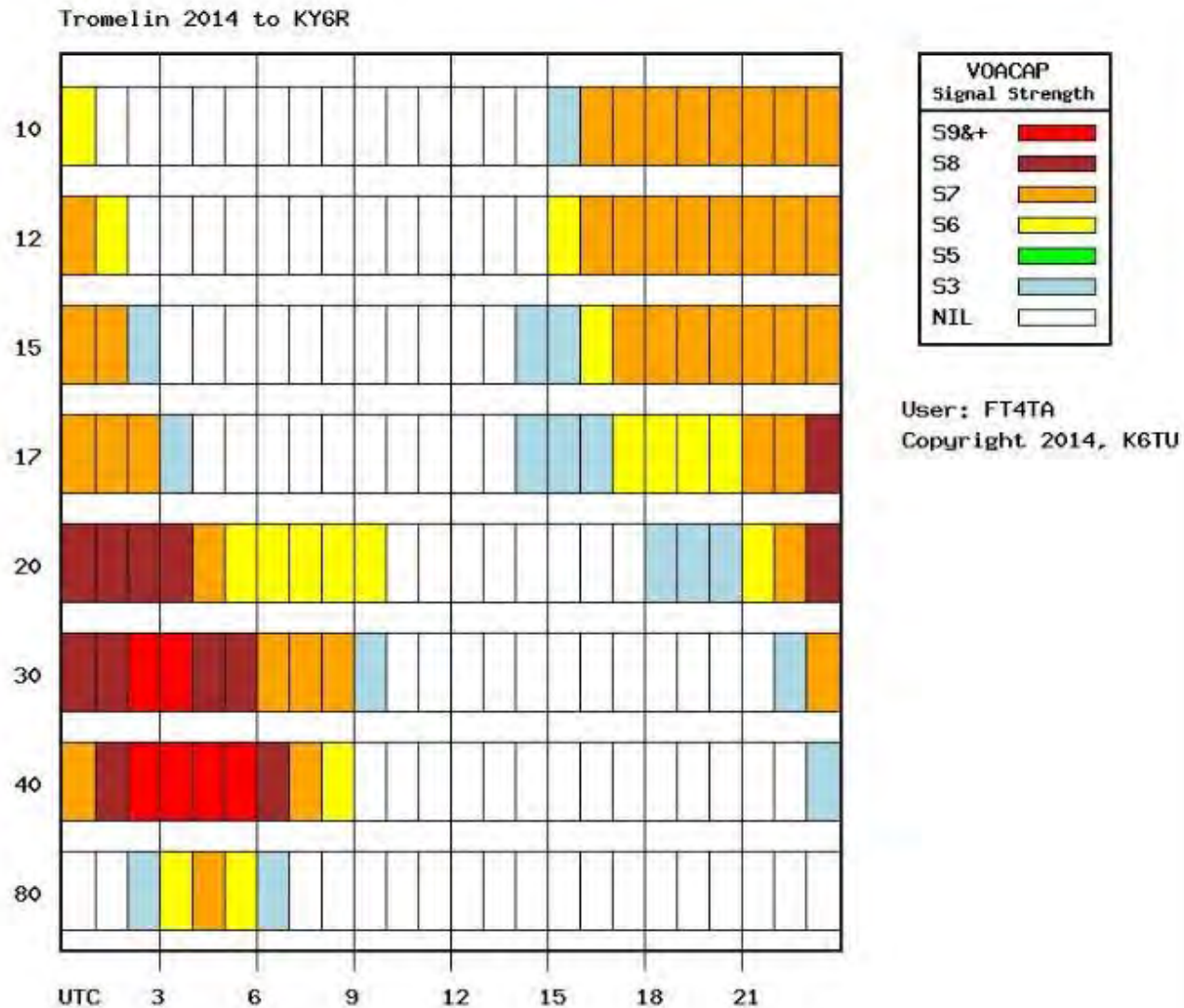


The improvement is @ 2 dB, but LP seems to have a lower probability than SP

AB-577

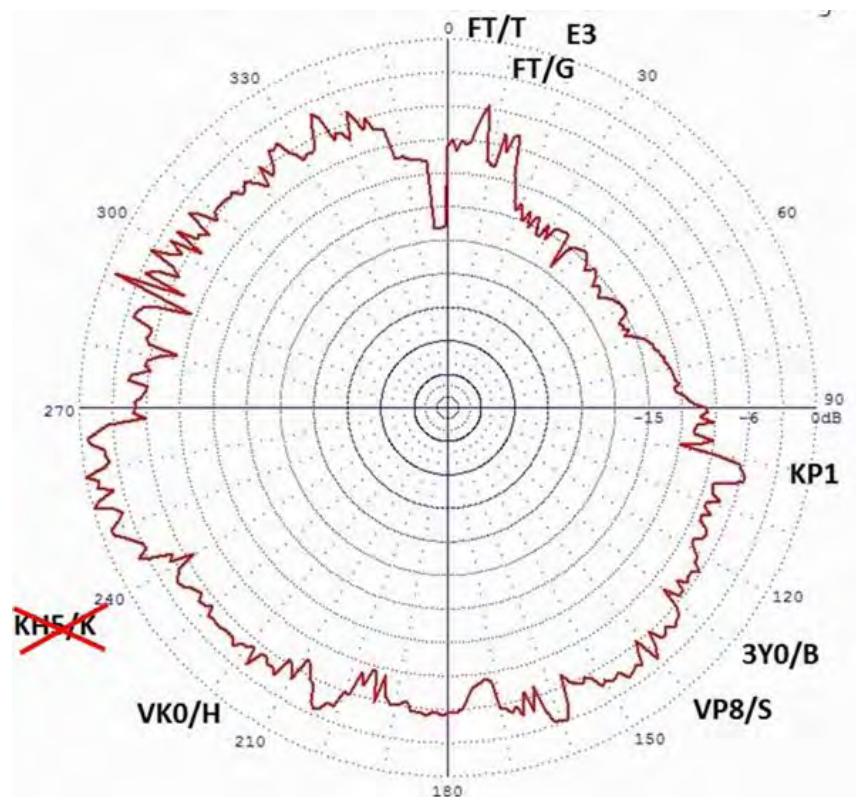


3. K6TU FT/T Prediction



80 – 10M are possible with 40 – 17M looking quite good. Grey line on 40 and 30M.

K6TU Combines HFTA Data With VOACAP



Stu can take your HFTA fans – if generated in 1 degree increments and then sweep through these – more or less stitch them together and output a file. Then you can take this file and run HFAnt on it – and you get the visualization you see here – a 360 degree azimuthal view. You can use this as your QTH site data in the K6TU Advanced section of his propagation prediction service. He also does low band predictions, and creates HFTA data for the DX-peditions that you see featured on his site - which means his service is the most complete propagation prediction service out there.

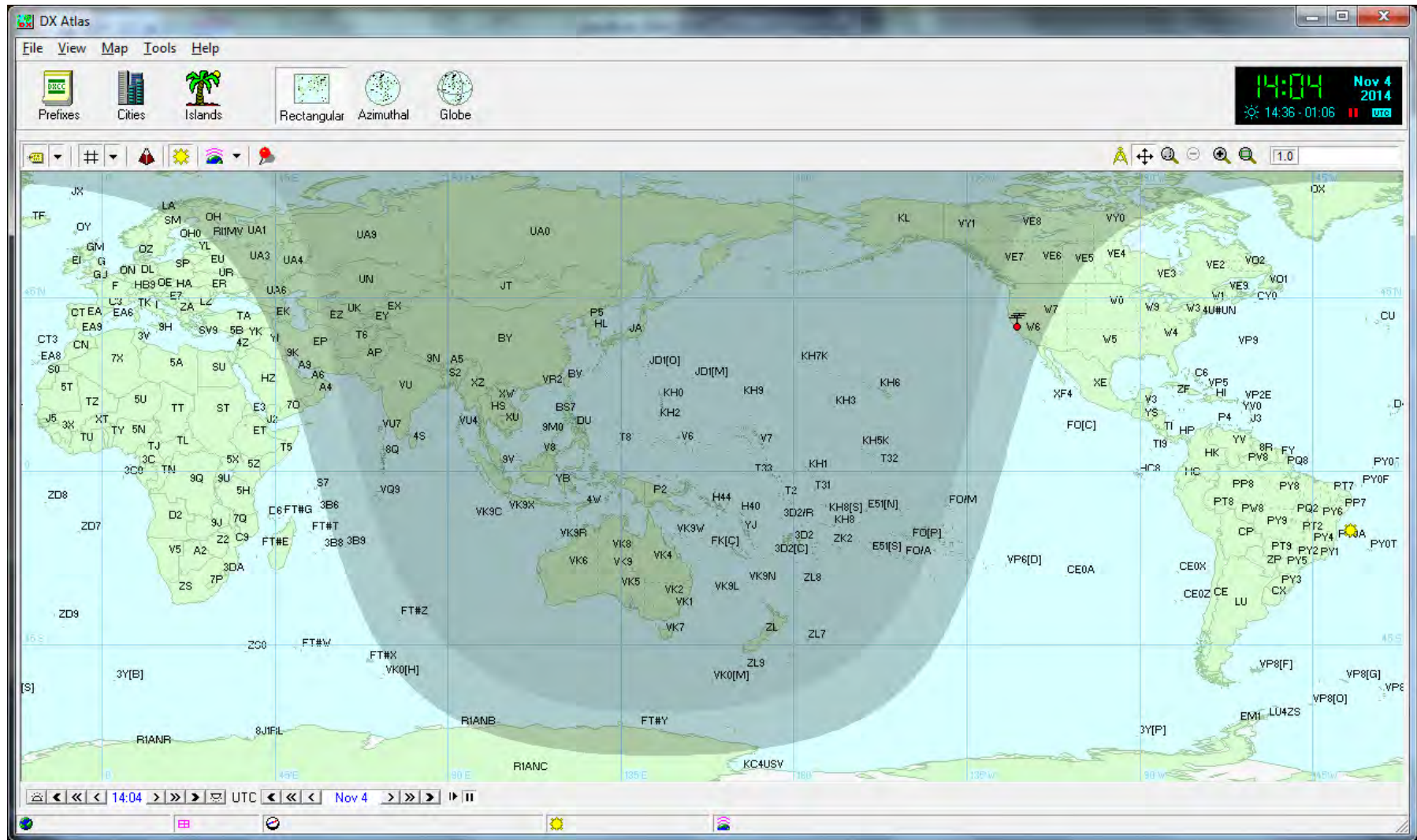
Dean, N6BV Propagation Prediction Tables

20 Meters: Nov., Glorioso, for SSN = Medium, Sigs in S-Units. (c) 2010 Dean Straw, N6BV

UTC -->																								
Zone	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
KL7 = 01	8	8	8	8	7	5	1	-	-	-	-	-	1	2	5	5	3	2	2	4	6	8	8	8
VO2 = 02	3	2	4	5	5	-	-	-	-	-	-	-	1	4	2	5	7	8	8	8	8	5	5	5
W6 = 03	6	7	9	5	3*	2*	1*	-	-	-	-	1*	1*	1*	2	8	8	6	7	3	4	5	6	6
W9 = 04	9	7	6	5	5	5	1	-	-	-	-	-	-	3	7	4	5	3	4	7	8	8	8	9
W3 = 05	8	6	5	6	6	6	2	-	-	-	-	-	1*	2	2*	1	1	4	5	7	8	8	9	9
XE1 = 06	9	9	9	8	8	6	4	1	-	-	-	-	-	7	6*	4*	1*	-	1	2	5	7	8	8
TI = 07	9	9	8	8	8	5	4	2	-	-	-	-	-	3*	3*	2*	1*	-	-	1	4	8	8	9
VP2 = 08	9	9	9	9	8	8	6	-	-	-	-	-	-	-	-	-	1	3	5	7	8	9	9	9
P4 = 09	9	9	9	8	8	7	6	-	-	1	-	-	1	1*	-	-	-	1	5	6	8	9	9	9
HC = 10	9	9	8	8	9	7	5	3	1	-	-	-	1*	2*	1*	1*	-	1	1	4	6	8	8	9
PY1 = 11	9	9	8	9	9	9	8	6	2	1	2	1	1	1	1	3	5	8	9	9	9	9+	9+	9
CE = 12	9	9	8	9	9	8	7	4	2	1	-	-	1*	1*	1	1	1	3	4	6	8	8	9	9
LU = 13	9	9	8	9	9	9	8	5	2	1	1	1	1	1	1	2	3	5	6	8	8	9	9	9
G = 14	8	8	8	6	1	8	8	5	2	2	1	1	4	6	8	9	9	9	9	9	9	8	8	8
I = 15	8	9	7	1	5	9	8	6	4	2	2	3	5	8	9	9	9	9	9	9	9	9	9	9
UA3 = 16	9	8	7	9	9	8	7	4	2	2	2	5	6	8	9	9	9	9	9	8	8	8	8	9
UN = 17	1*	1	9	9	9	7	5	4	4	4	5	7	8	9	9	9	9	9	8	5	6	7	7	4
UA9 = 18	8	8	9	9	8	4	2	2	1	1	3	6	8	9	9	8	8	6	4	6	7	8	7	7
UA0 = 19	8	8	6	6	3	1	1	1	1	1	2	5	8	8	9	8	8	8	8	8	5	2	7	9
4X = 20	9+	7	-	5	9	9	9	8	5	4	4	6	8	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
HZ = 21	8	2	3	9+	9+	9+	9	8	8	8	8	9	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
VU = 22	4	6	9+	9+	9	8	7	6	5	6	7	9	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9
JT = 23	9	8	8	8	6	4	2	1	2	2	4	6	8	9	9	9	8	7	5	6	8	7	5	7
VR2 = 24	9	8	8	7	4	1	1	1	2	3	4	6	9	9	9	9+	9+	9+	9+	9+	9	6	8	8
JA1 = 25	8	7	5	4	1	1	1	1	1	2	5	6	8	9	9	9	9	9	9	9	5	1	8	9
HS = 26	9	9	9	9	7	7	5	5	5	5	7	9	9	9+	9+	9+	9+	9+	9+	9+	9+	9	9	8
DU = 27	8	8	7	5	5	2	1	1	4	4	6	7	9	9	9	9+	9+	9+	9+	9+	9	8	8	9
YB = 28	9	9	9	8	6	4	2	2	3	5	7	8	9	9+	9+	9+	9+	9+	9+	9+	9+	9	9	9
VK6 = 29	9	8	8	7	6	5	5	4	3	5	6	8	9	9	9	9	9	9	9	9	9	9	9	9
VK3 = 30	8	7	6	6	5	5	3	3	2	3	5	7	9	9	9	9	9	8	7	8	9	9	9	9
KH6 = 31	1*	3*	3*	6	7	4*	2*	1*	-	-	1	4	6	7	7	5	1*	2	9	9	7	5	2	-
KH8 = 32	-	-	1*	4*	4*	3*	1*	-	-	1	2	5	7	9	9	9	9	9	9	9	8	6	2	1
CN = 33	9+	9	9	8	2	1	7	5	2	1	1	1	2	5	7	8	9	9	9	9	9+	9+	9+	9+
SU = 34	9+	7	-	5	9	9	9	8	5	4	4	6	8	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
6W = 35	9	9	9	9	8	-	8	6	3	4	1	1	1	2	4	7	9	9	9	9	9	9	9	9+
D2 = 36	9	8	6	5	8	9+	9	9	8	7	7	7	8	9	9	9+	9+	9+	9+	9+	9+	9+	9+	9+
5Z = 37	9+	9+	9+	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
ZS6 = 38	9+	9+	9	9+	9+	9+	9+	8	9	9	9	9	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
FR = 39	9	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
FJL = 40	1*	1*	2*	1*	6	8	5	2	1	1	2	4	6	8	9	9	7	5	2	1*	1	1	1	1
Zone	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23

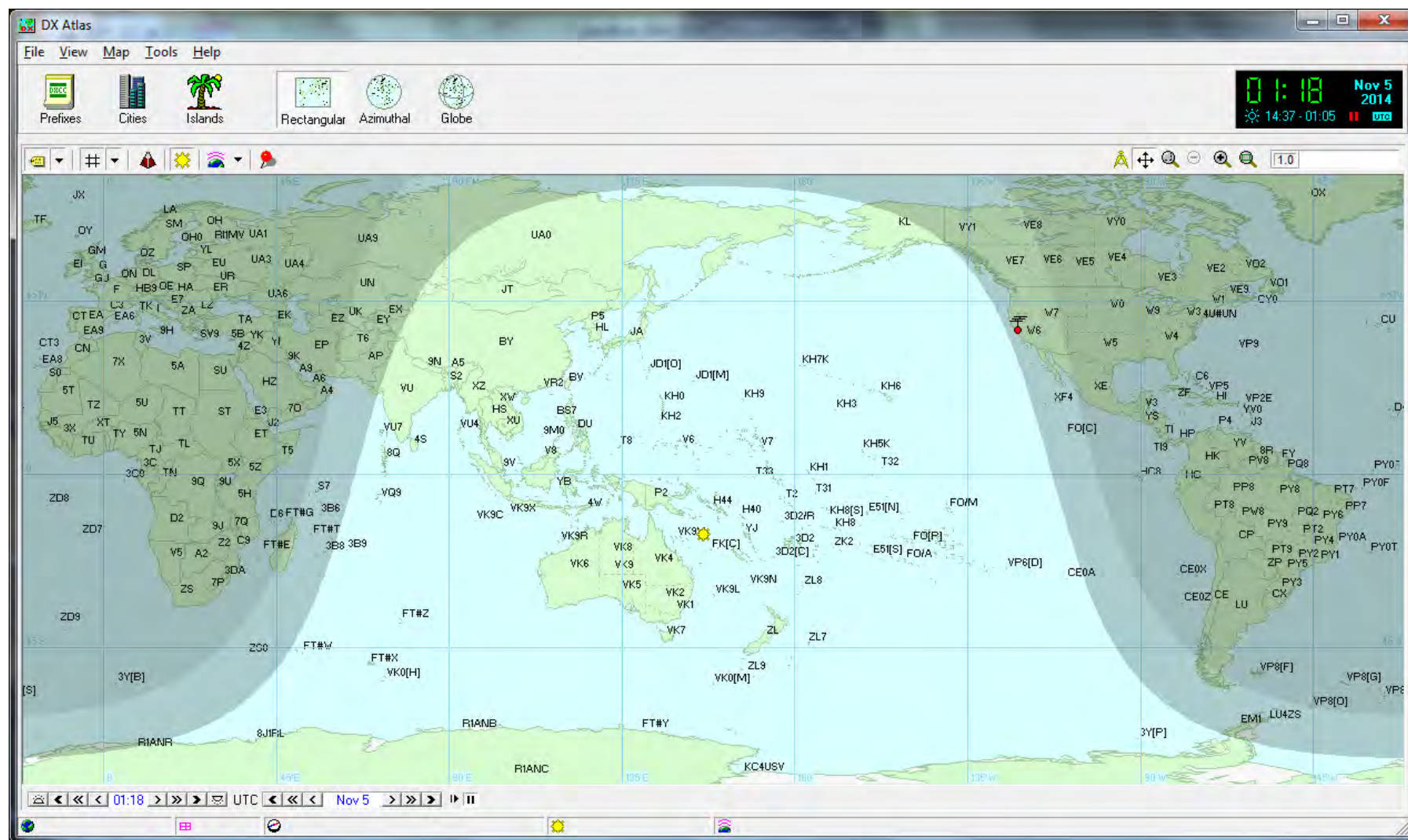
Zone UTC -->
 * = Longpath
 Expected signal levels using 1500 W and 12 dBi isotropic antennas.

4. DX Atlas – Morning Grey Line



Remembering TO4E and the “3B’s” whom I worked in the past on the AM grey line, FT4TA lines up perfectly for an 80, 30 and 40M grey line. 20M should also be good on this path. Plus the most important thing – there will be less competition for this short time.

DY Atlas – Evening Grey Line

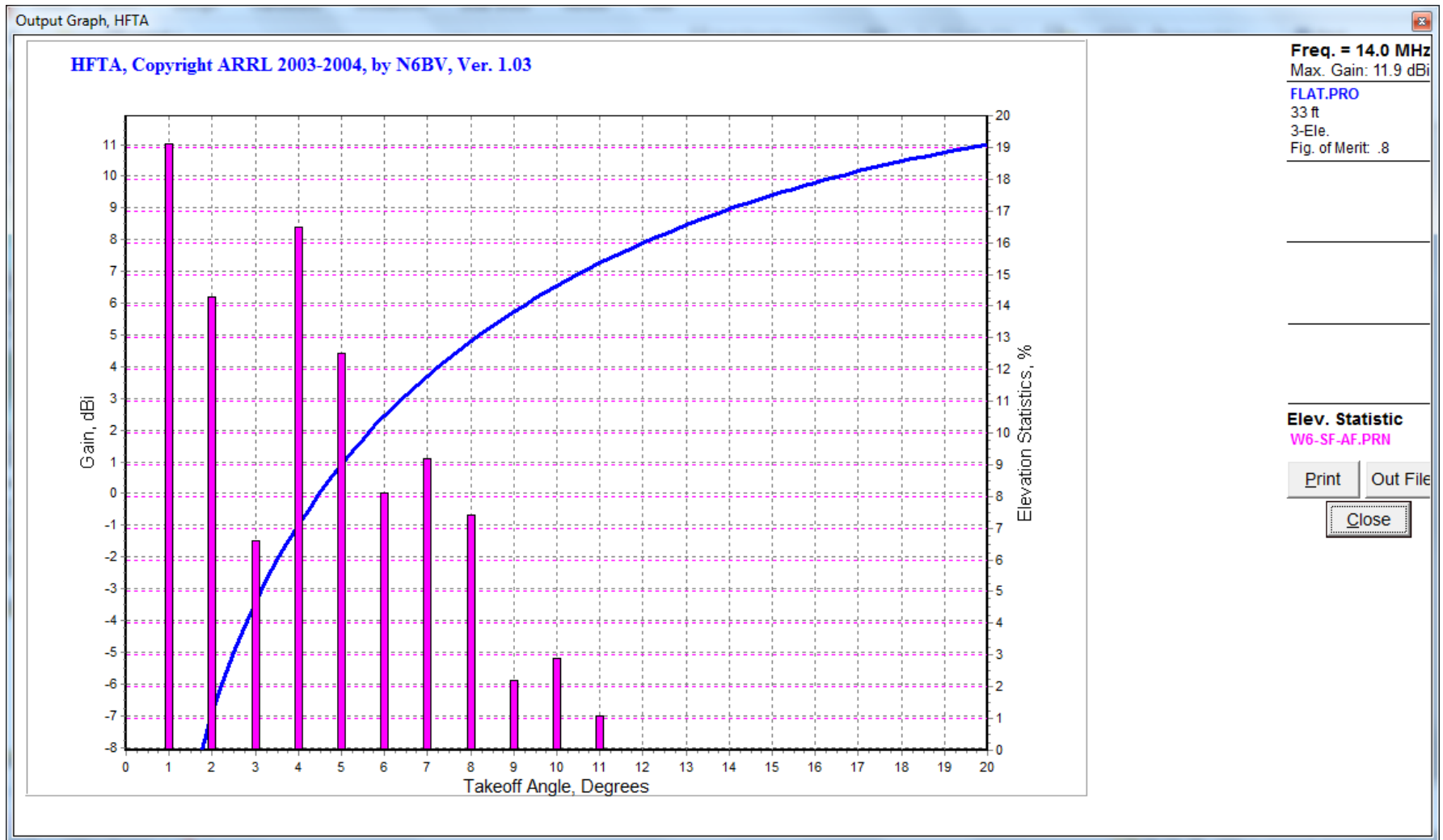


For the night time grey line, using the higher bands would be the best – 20 – 10M might still be open for the West Coast, and opening up for FT/T. There would be too much competition on the low bands.

What Antennas Will FT4TA Use?

- Their HFTA would be FLAT
- They will use 2 element phased vertical dipoles
- “Faking It” means – a 2 element vertical array is either like a high dipole or a 2 element yagi up $\frac{1}{2}$ wl – depending on ground conditions
- Because they will be on the beach – I would say that their 2 element vertical array would be like a trapped triband yagi up $\frac{1}{2}$ w.l. “gain – wise, yet supporting very low take off angles

HFTA for FT4TA

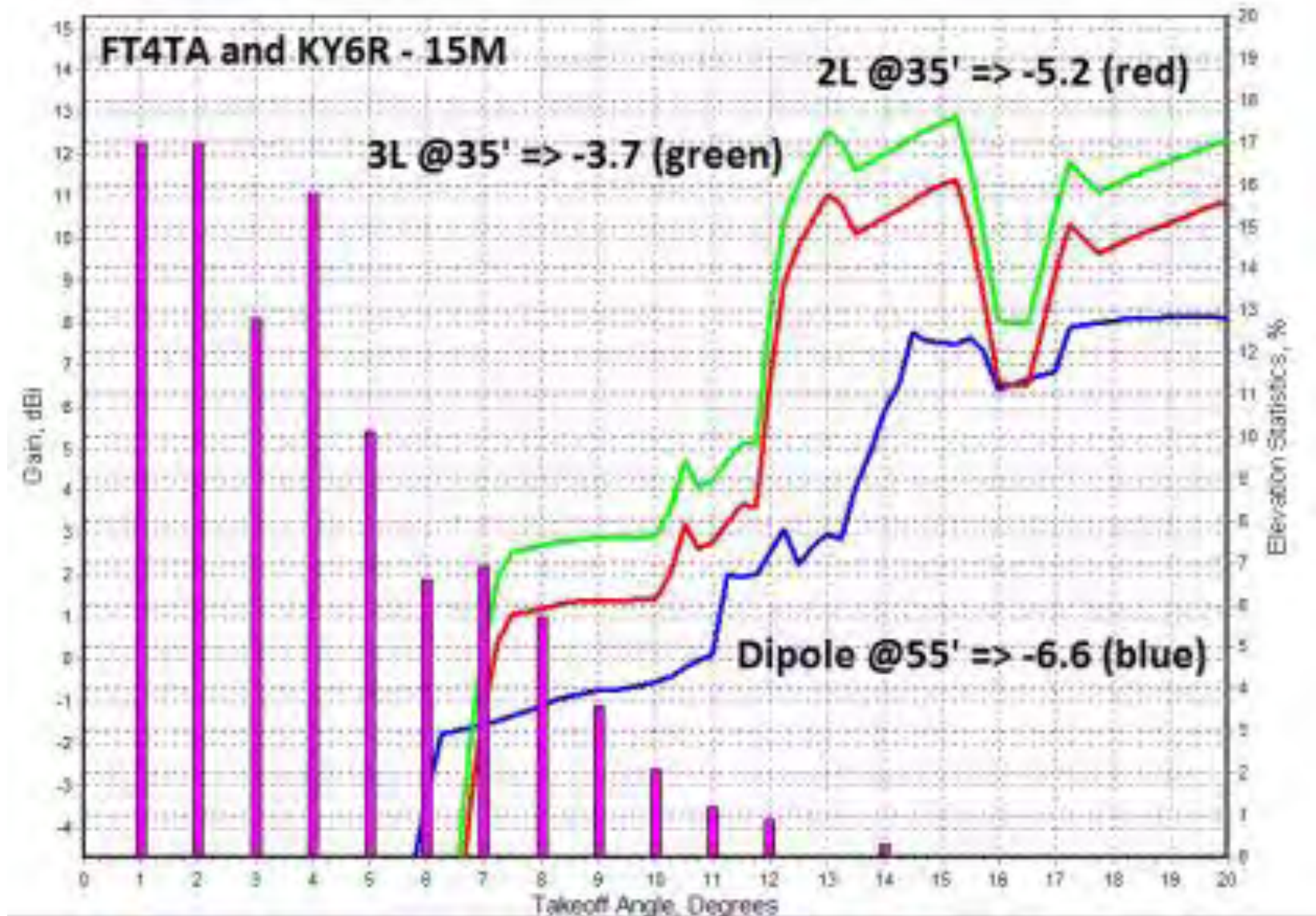


There is no reason (technically speaking) that the FT4TA team would have a difficult time working the West Coast. It will all rely on their operating skill and antenna set up.

What Can I Do to Improve My Probability?

- I'm set on 160, 80, 40, 30 and 20M
- While Cycle 24 is now on the wane – the higher bands are still very much in play
- I need to do something above 20M – I am guessing that using my 3L 20M yagi as a rotatable dipole for FT4TA is just OK – but I want to have a more “decisive” probability
- Confidence is everything in DX-ing – you have to believe you will bust through the pileups

15M Possibilities for FT4TA



While I'd love to put up a 3 element monobander, I just can't. A 15M Moxon is possible

5. Build the 15M Moxon

The screenshot shows the 'Moxon Rectangle Generator' software window. It features a central diagram of a Moxon antenna with a 'Driven Element' and a 'Reflector'. Dimensions A, B, C, D, and E are labeled on the diagram. To the right of the diagram, input fields for Frequency (21.175 MHz) and Wire size (#12 AWG) are shown, along with a 'Calculate' button. Below these are five dimension input fields: A (202.87 in), B (30.58 in), C (5.54 in), D (37.87 in), and E (73.99 in). Further right are settings for Format (EZNEC selected), Polarization (Horizontal selected), and Main lobe (On X axis selected). At the bottom right are 'Print' and 'Close' buttons. A 'Results Units' section at the bottom right shows 'Inches' selected.

Frequency: 21.175 MHz Wire size: #12 AWG Calculate

Diagram labels: A, B, C, D, E, Feedpoint, Driven Element, Reflector

Dimensions:

- A: 202.87 in
- B: 30.58 in
- C: 5.54 in
- D: 37.87 in
- E: 73.99 in

Format:

- ☒ EZNEC
- ☐ NEC

Polarization:

- ☒ Horizontal
- ☐ Vertical

Main lobe:

- ☒ On X axis
- ☐ On Y axis

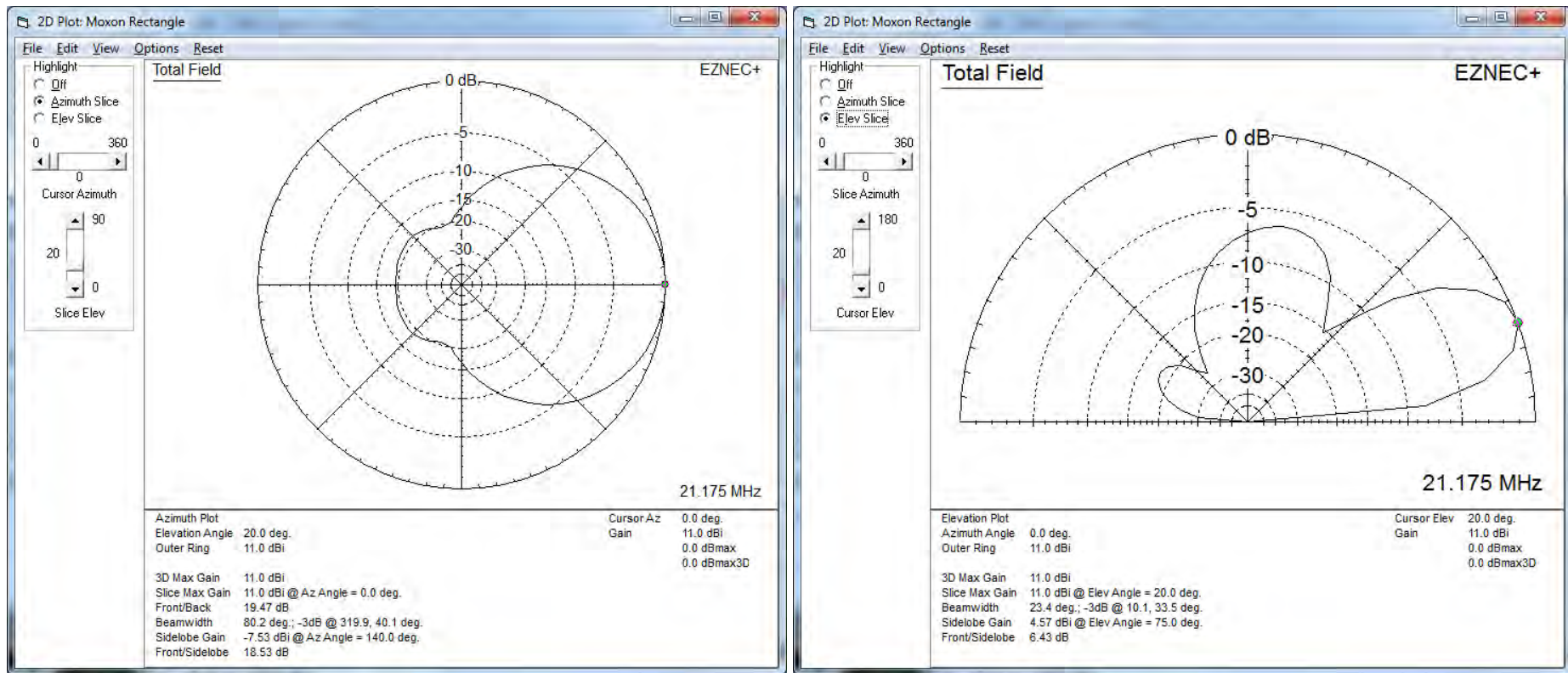
Results Units:

- ☐ Feet
- ☒ Inches
- ☐ Meters
- ☐ Millimeters

Print Close

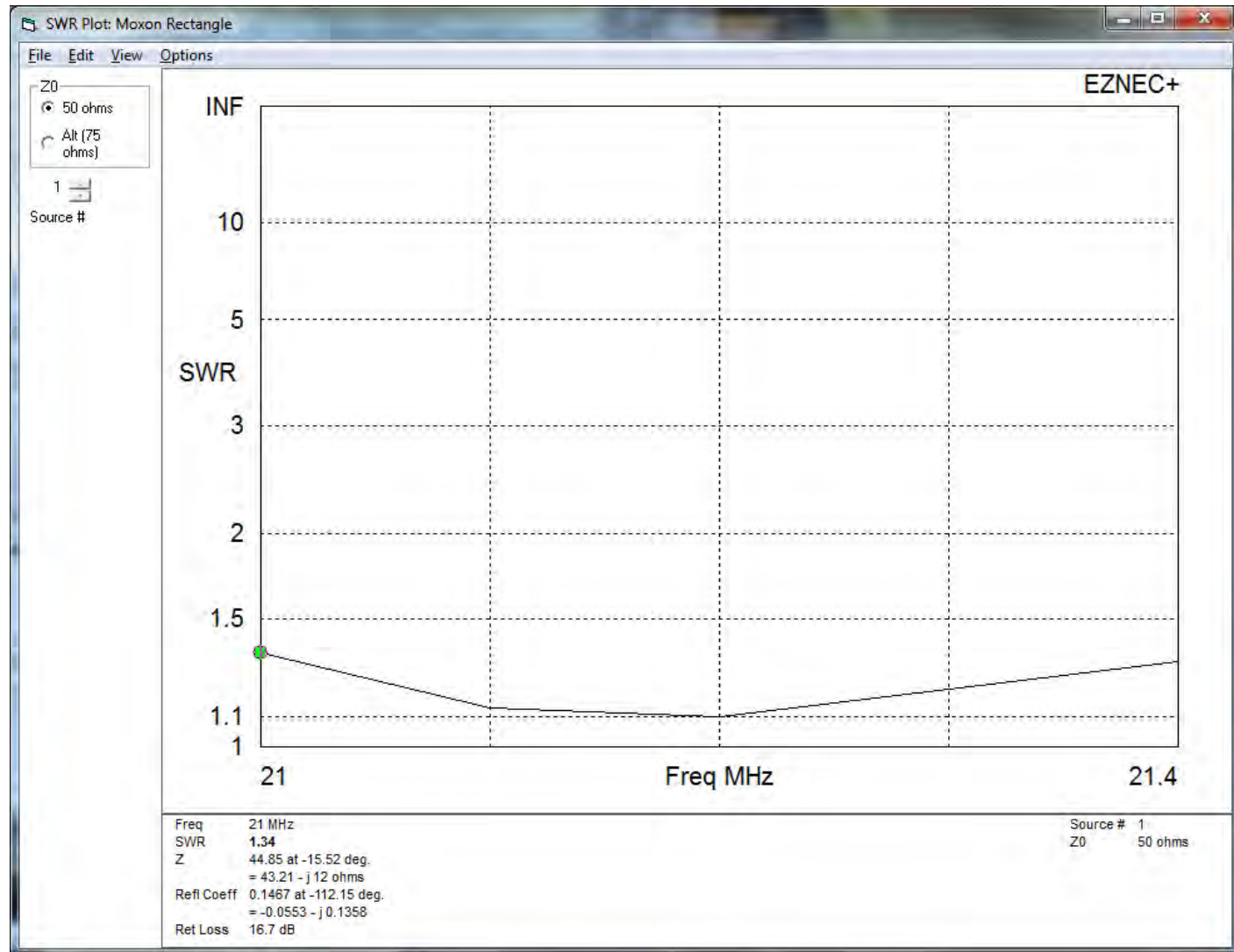
Moxgen – free download (Google Moxgen)

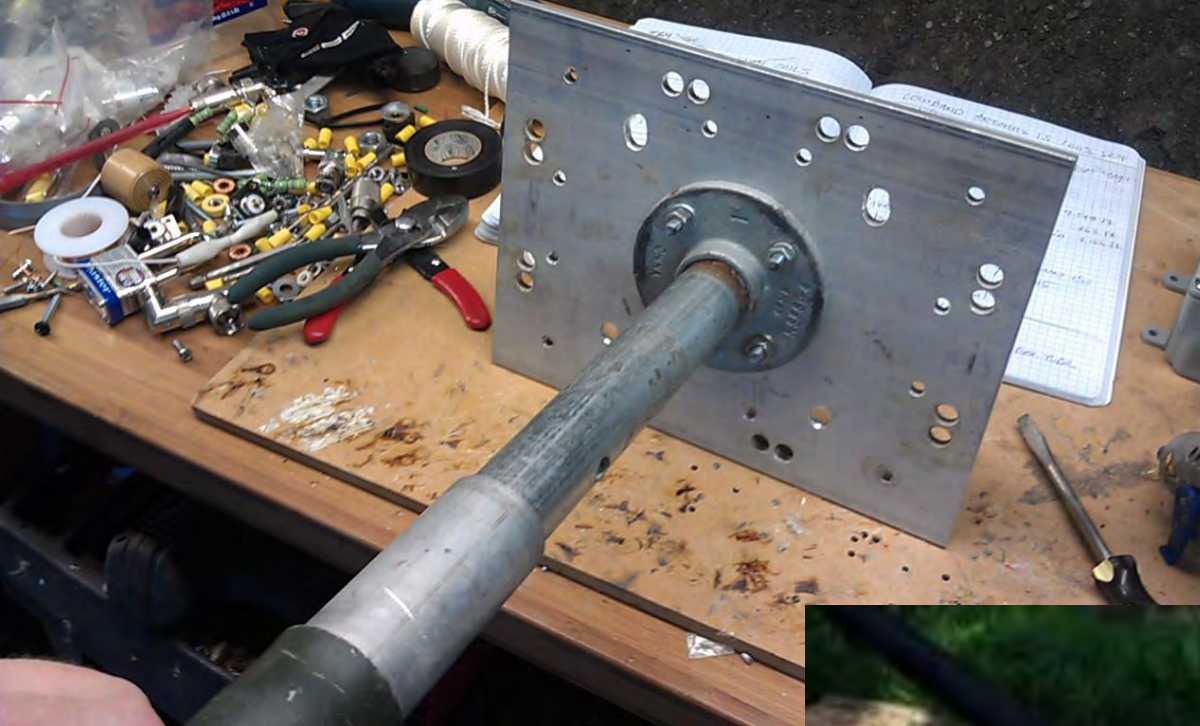
Save Model as EZNec File



Make sure you add copper loss, raise the height, set the right ground (I use High Accuracy) and check the “SRC DAT” so that the frequency is 50 ohms. The Moxon is the easiest way to get gain and directivity in a very small footprint, inexpensive and light weight package.

15M Moxon SWR Curve





Hub made from DX Engineering
BMP-2B boom to mast plate,
with 4 extra holes drilled.

Floor flange from HW store,
rust welded

Top of hub showing aluminum
Sleeves where flange bolts hold one
End, and the u-bolts hold the Crappie
poles





Plasti-dip protects
Crappie poles from UV

Use masons twine to
get the end spacing
correctly



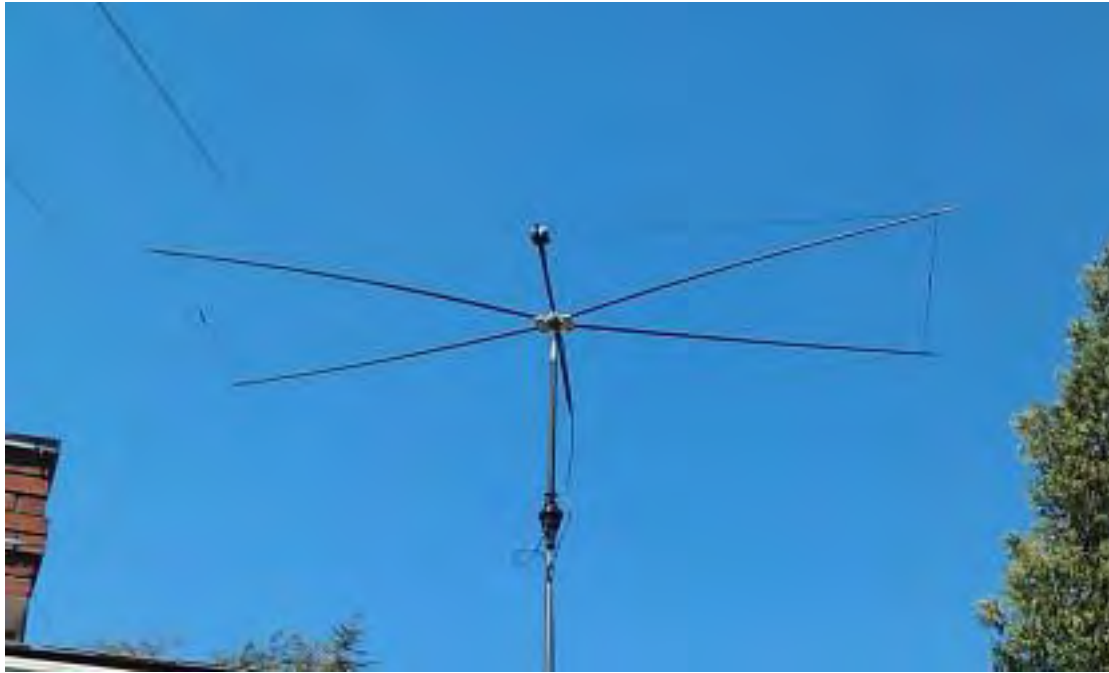


Use ring lugs on Flex Weave #14 awg, and nylon bolts and nuts that go into pieces of Crappie pole for the gap spacers. Glue gun ensures this will stay in place



Use wire ties to hold the wire and 1:1 choke, and tape accordingly!

15M Moxon up 30'



A – B Tests between the Moxon at 30' and the driven element on my 3L 20M yagi – used as a rotatable dipole and up 45' (using RBN to test with):

DIPOLE @45'

WA3OPY	10 dB
KH6LC	13 dB
PJ2T	-----
ACOC	-----

MOXON @30'

13 dB
18 dB
9 dB
7 dB

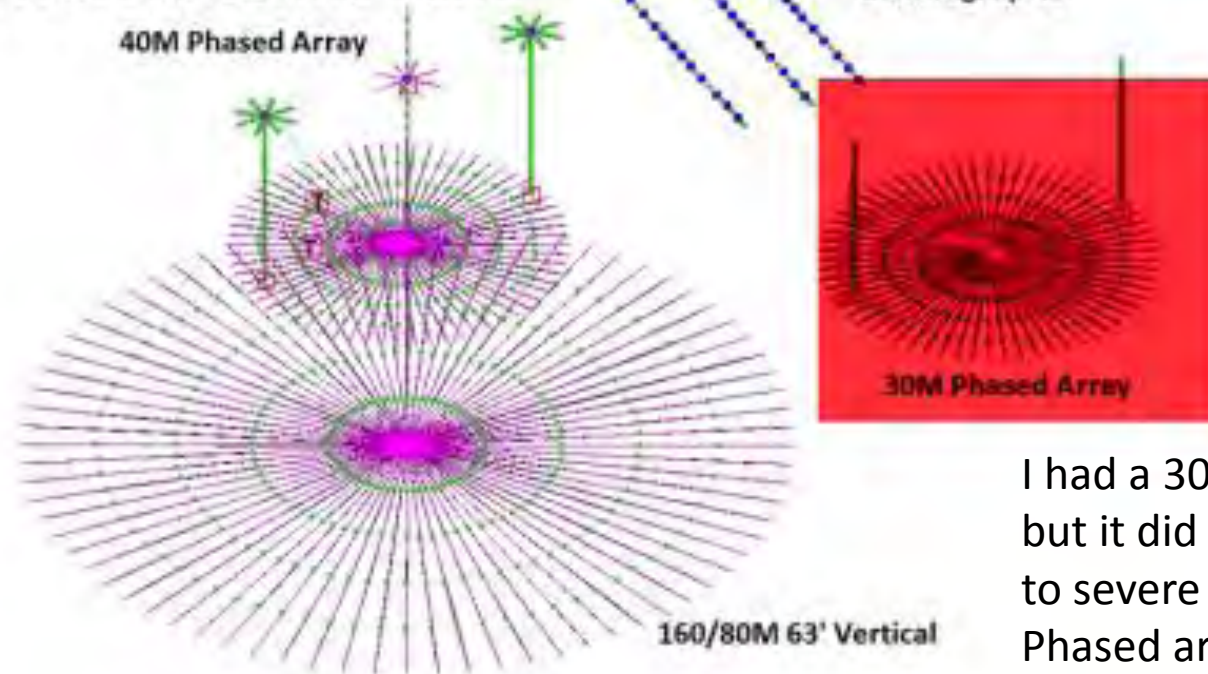
With QSB, these numbers are very much in line with what the HFTA and Eznec models predicted.

FT4TA – “Social Engineering”

- The NCDXF gave FT4TA a donation of \$25K, or $\frac{1}{4}$ of their budget
- They know that they are expected to make a serious effort for the West Coast. In fact, I asked them personally before I gave my \$100 donation
- I asked if they would be “more like TO4E than FT5GA”
- John, K6MM is the West Coast Pilot
- This all has to do with predicting “probability”

Negative Interaction

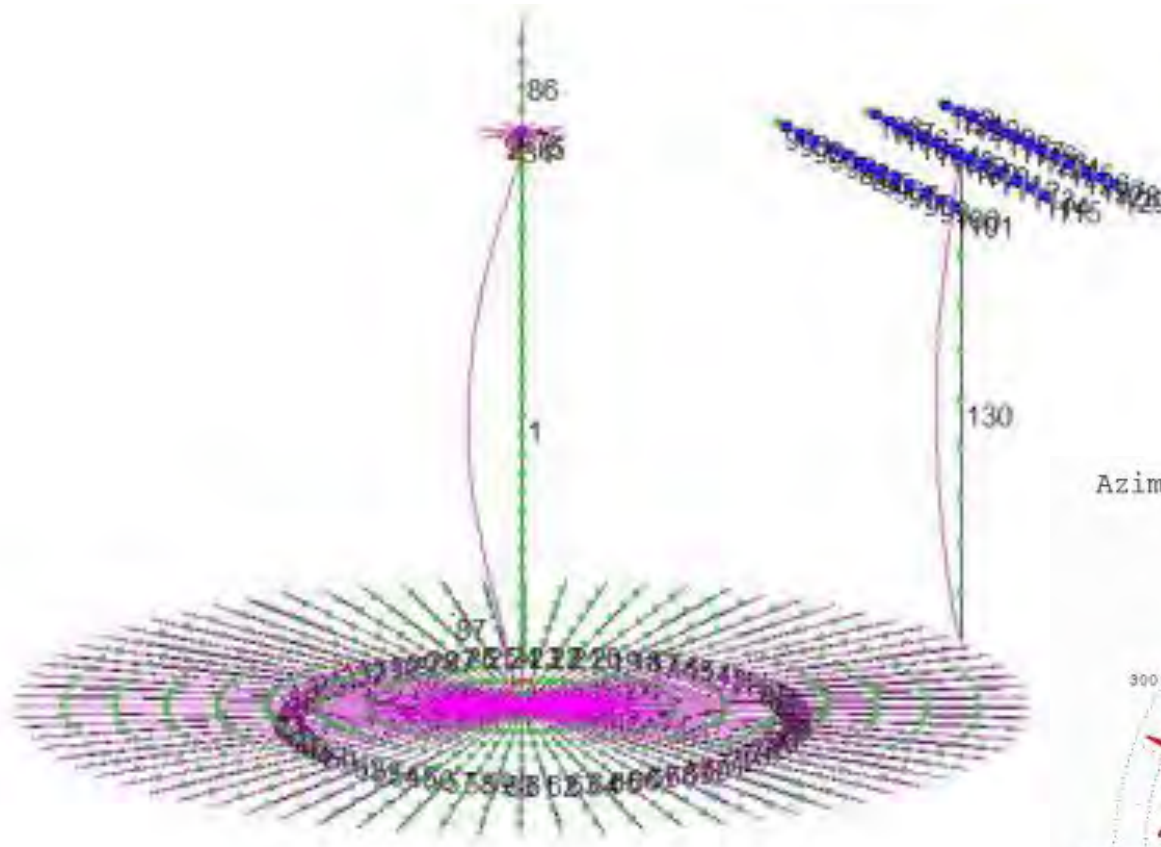
KY6R Antenna Farm



I had a 30M phased array up but it did not work well due to severe interaction with the 40M Phased array

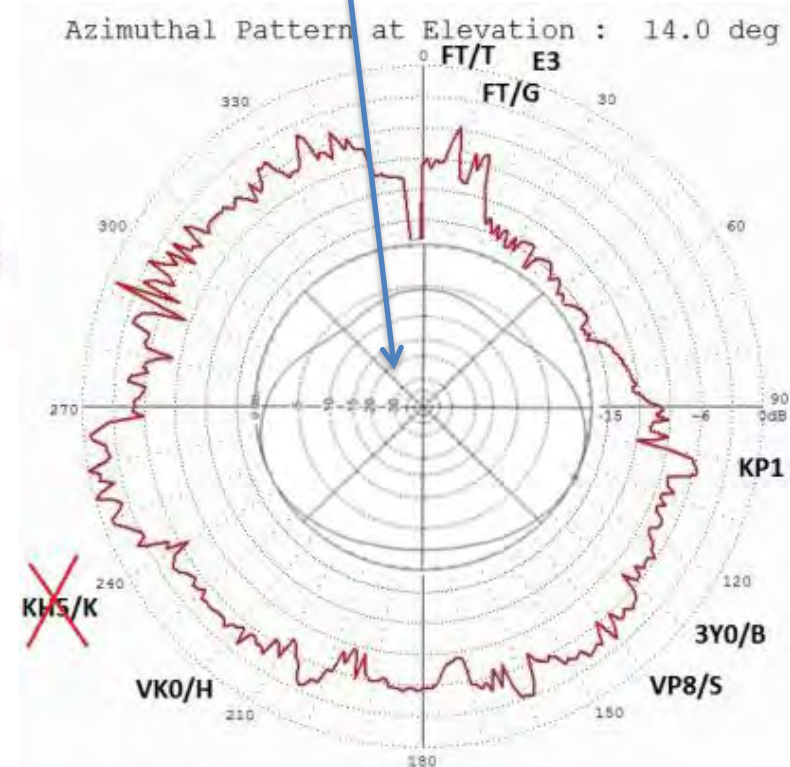
- Keep your antennas at least 1/2 w.l. apart – especially if they are of the same polarity
- Use EZNec to model ALL of your antennas and radials
- Make sure you model the tower or masts for all horizontal antennas – they can and will act as “pattern distorting reflectors”
- You can actually use masts and towers as reflectors on purpose – and part of an “holistic engineered design”
- If your Array Solutions 40M Stack Match II Led lights light up when transmitting on your 160M vertical – you probably have negative interaction!

“Happy Accident (?)”



Tower would act as reflector
for 160/80M vertical
IF used on 30M, but pointing
due south . . .

Because I use the 40M phased array on 30M
this is not a benefit – but also not a hindrance.
the 40M phased array works very well on 40M
and quite good on 30M.



6. *After* Improving Antennas, Add . .

An amplifier won't improve what you can hear!



Going from an Elecraft KPA-500 and KAT-500 to this ACOM 1500 forced me to make sure that every component in the antenna line could handle the power. (\$750.00 price drop!)

7. Have Fun in the Pileups!



Next Case Study – DXCC on 160M

- The Proven Strategy can be used – but in an abbreviated form
- This is because on 160M, HFTA doesn't work for verticals, and propagation predictions are not available
- DX Atlas is the best tool to use for planning 160M – basically, you want to know when the grey line is and when there is mutual darkness between you and the DX

Second Goal – DXCC on 160M

- DXCC on 160M and 6M are the two most difficult bands to earn DXCC on
- I am addicted to 160M – and not at all interested in 6M
- 160M - being just above the AM radio band brings me back to those days of SWL-ing and BCB DX-ing in 1971 - 73

FT5ZM QSO's →

	10m	12m	15m	17m	20m	30m	40m	80m	160m
PH		✓	✓		✓		✓		
CW			✓	✓	✓	✓	✓	✓	✓
RTTY									

Who Will Be on 160M and When?

NG3K Home [ADSO](#) [Contest](#) [DXCC](#) [CIS-Pty](#)

Announced DX Operations

[\[About ADSO\]](#) [\[Search ADSO\]](#) [\[ADSO Text Version\]](#) [\[Abbreviations\]](#) [xxx](#)
[Submit a DXpedition]

Active 2014	Expired 2014	Expired 2013	Expired 2012	Expired 2011	Expired 2010	Expired 2009	Expired 2008	Expired 2007	Expired 2006	Expired 2005	Expired 2004	Expired 2003	Expired 2002	Expired 2001	Expired 2000	Expired 1999	Expired 1998	Expired 1997	Expired 1996
Expired Contest and Special Operations (1996+)																			

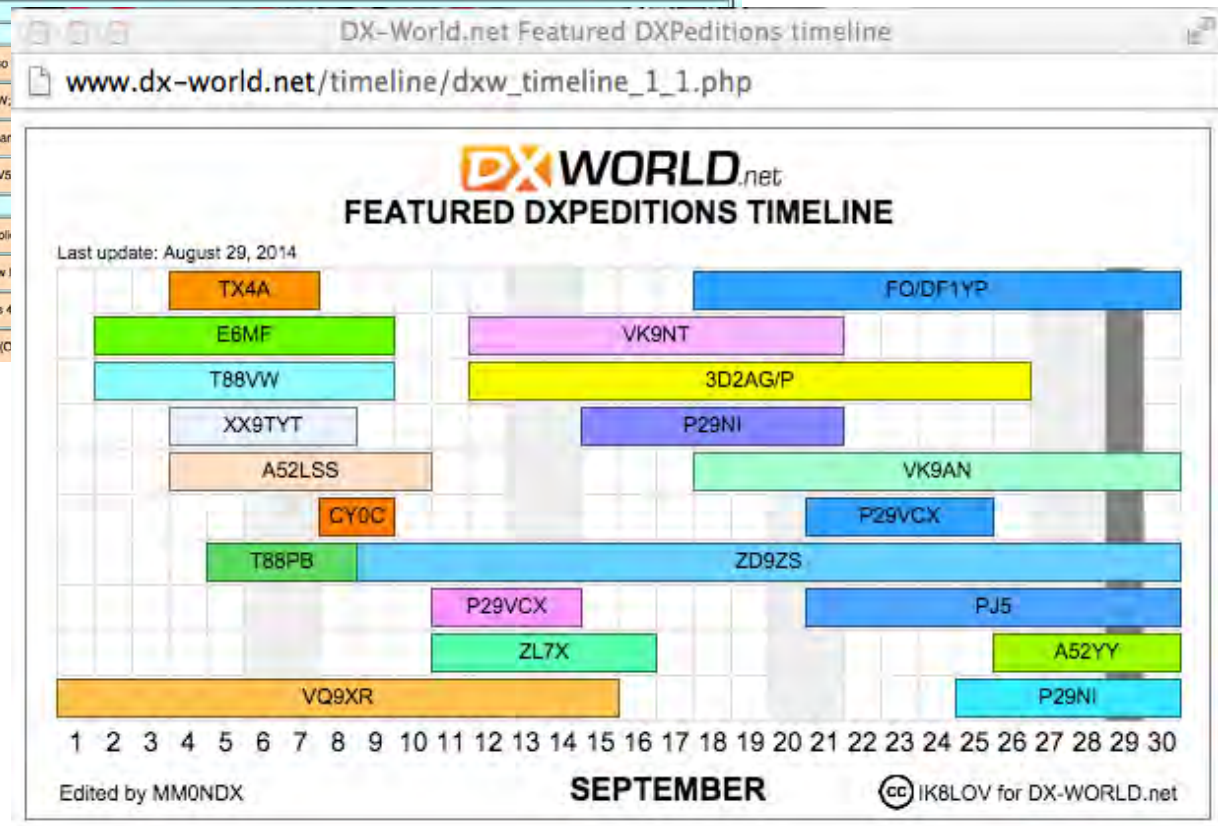
Last updated: Tuesday, 02-Sep-2014 06:42:15 EDT
[Currently Active Operations]
[Spots provided courtesy of DX-Watch]

Start Date	End Date	DXCC Entity	Call	QSL via	Reported by	Info
2014						
July						
August						
2014 Aug24	2014 Sep03	Palau	T88AT <small>(contest)</small>	LotW	DXW.Net 20140821	By KQ2I; 40 30m; CW; QSL also
2014 Aug24	2014 Sep07	Crete	SV9 <small>(contest)</small>	LZ1PM	LZ3FN 20140801	By LZ3FN; all bands; mainly CW;
2014 Aug26	2014 Sep02	Mariana Is	KH0 <small>(contest)</small>	OZ0J	DXW.Net 20140620	By OZ0J as KH0/OZ0J fm Saipar
2014 Aug28	2014 Sep08	Dodecanese	SV5 <small>(contest)</small>	GM0IIO	ATDX 20140825	By GM0IIO KQ8Z C6AZZ as SV5
September						
2014 Sep01	2014 Sep03	Botswana	A25GF <small>(contest)</small>	ZS6AYU	ZS6AYU 20140713	By ZS6AYU fm KH22od; 6m; holi
2014 Sep01	2014 Sep09	New Caledonia	TX4A <small>(contest)</small>	Club Log	DXW.Net 20140621	By VE3LYC KD1CT fm Matthew I
2014 Sep02	2014 Sep09	Niue	E6MF <small>(contest)</small>	ZL2MF	ATDX 20140816	By ZL2MF; 20 15 10m, perhaps 4
2014 Sep02	2014 Sep09	Palau	T8 <small>(contest)</small>	OZ0J	DXW.Net 20140619	By OZ0J as T88VW fm Koror I (C

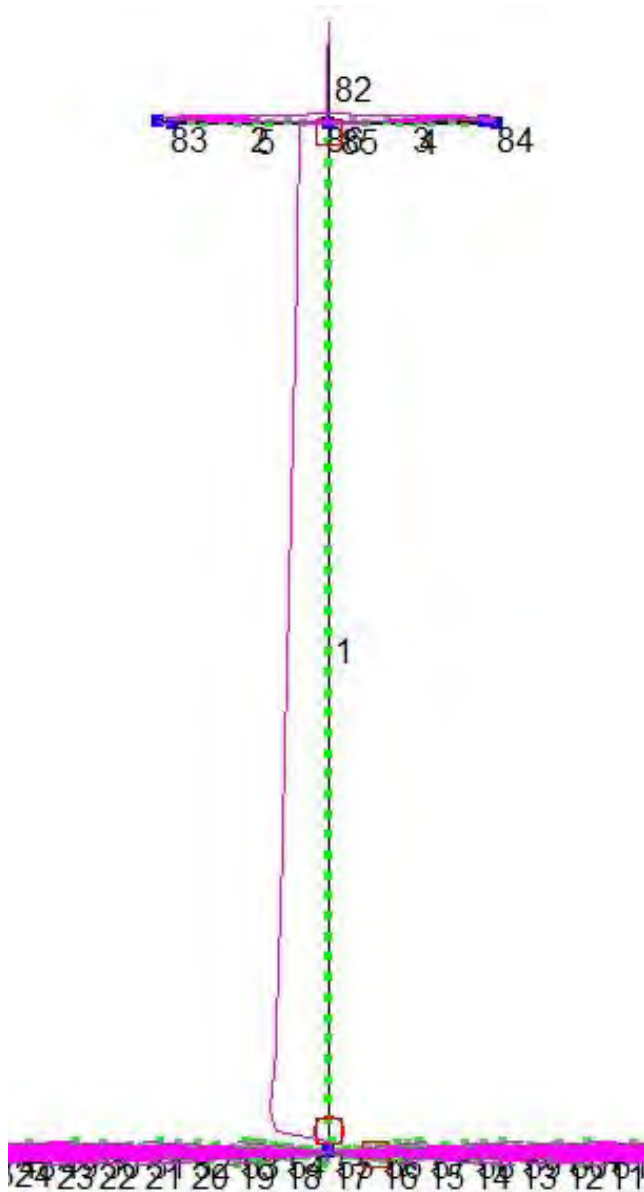
My best DX on 160M
Amsterdam and
Namibia

160M is mostly about
DX-peditions who bother
with 160M.

OC-Pac, Asia and Caribbean
are the emphasis



Possible Top Band Vertical Antennas



Sevick – W2FMI Style Short Top Loaded



Drooping top hat “spokes” – as guy wires



Inverted L

Improving the Top Band Antenna



Increased size
of radiating
Section – from
36' to 55'

Replaced small
“spoked” cap
Hat with 33'
circumference
#14 awg Flex
Weave cap hat
and four heavy
duty 6' spokes



Improving the Top Band Antenna



Replaced
MA160V large
Coil with smaller
Airdux coil (not
Shown here).

Used old Hustler
cast aluminum
spoke hub.

Spokes assisted
with Mason's
Twine



100 Radials Plus “Screen”



Improving the Top Band Antenna

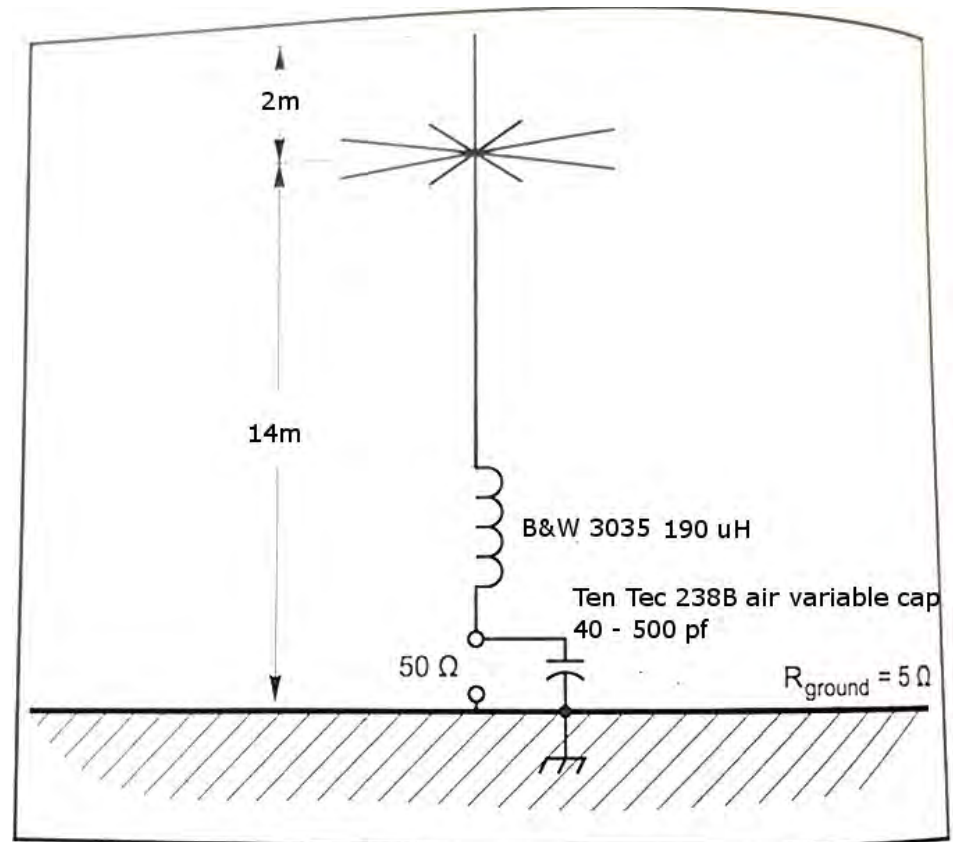
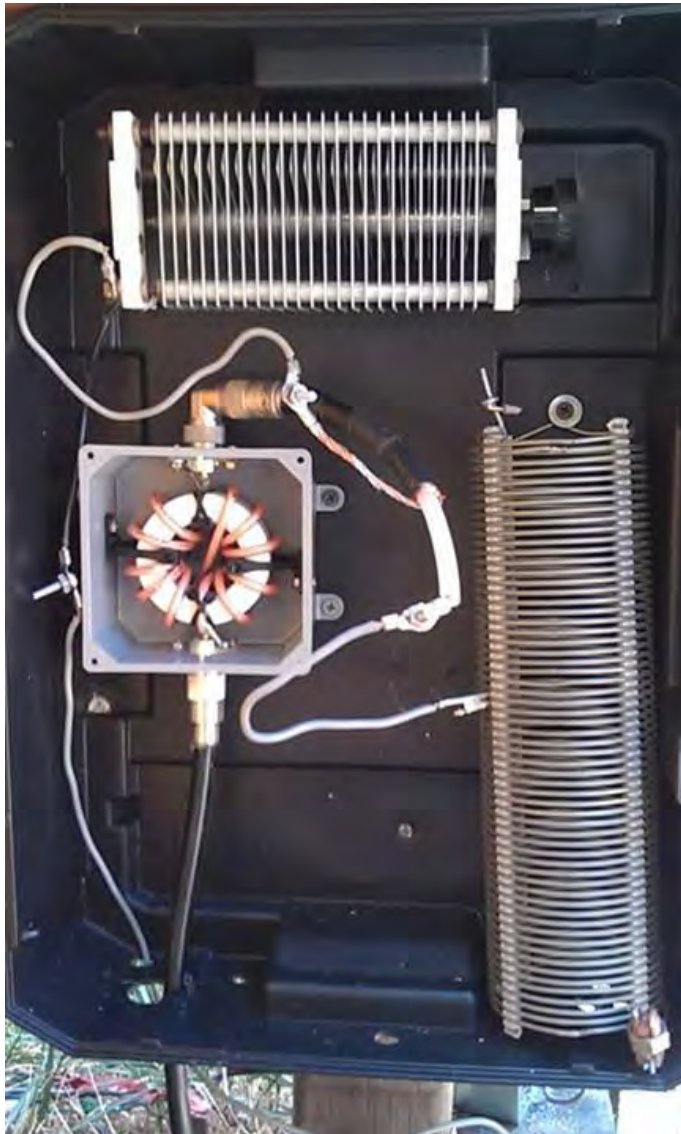


Table 9-9

Comparison of 15-Meter Tall Verticals for 160 Meters

Length of vertical = 15 m (= 35°); diameter = 25 cm effective; F = 1.83 MHz

	----Ground R = 15 Ω----		---- Ground R = 10 Ω ----		---- Ground R = 5 Ω ----	
	R_{rad} / R_{feed}	Eff (%) / -dB	R_{rad} / R_{feed}	Eff (%) / -dB	R_{rad} / R_{feed}	Eff (%) / -dB
$\frac{1}{4} \lambda$ full size (39 m)	36 / 51	71 / -1.5	36 / 46	78 / -1.1	36 / 41	88 / -0.6
Flat top hat (T ant)	12.4 / 27.4	45 / -3.4	12.4 / 22.4	55 / -2.6	12.4 / 17.4	72 / -1.5
2 sloping wires ¹	8.3 / 23.3	36 / -4.5	8.3 / 18.3	45 / -3.4	8.3 / 13.3	65 / -1.9
2 sloping wires ²	5.6 / 20.6	27 / -5.6	5.6 / 15.6	36 / -4.4	5.6 / 10.6	53 / -2.8

¹top loading, sloping T, end loading wires 8 m above ground

²top loading, sloping T, end loading wires 2 m above ground

Improved efficiency from 40% to > 60%

Why No 160M RX Antennas?

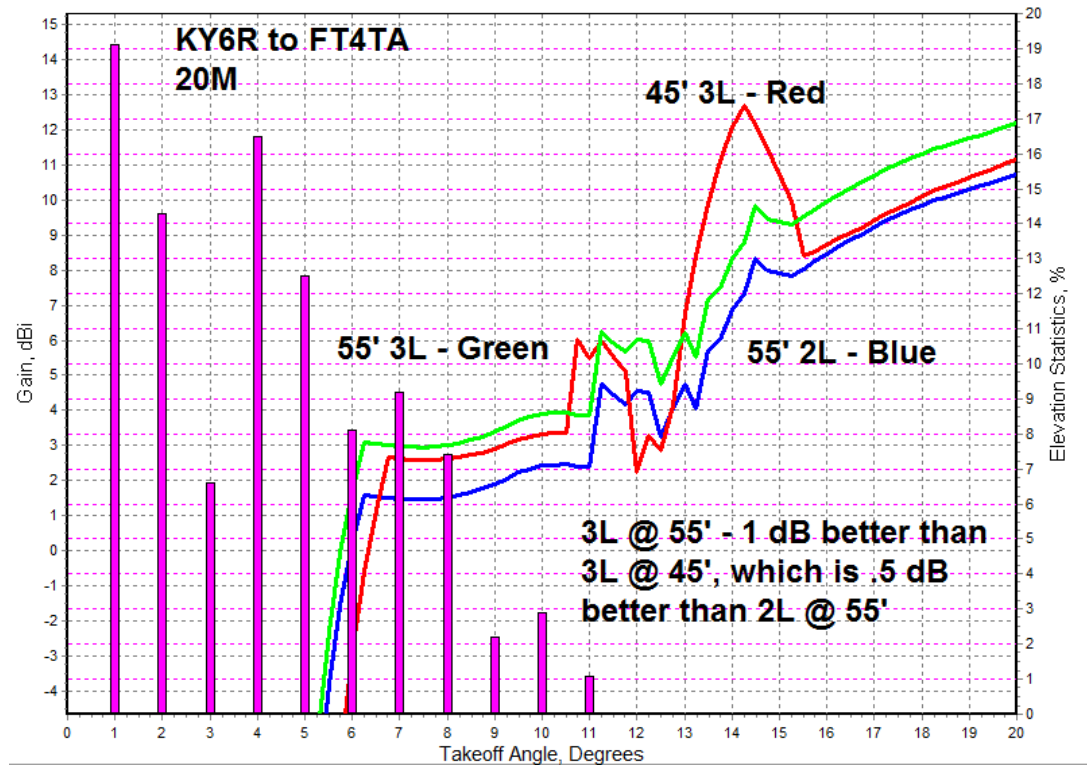
- I had K9AY and N6RK Loops w/MFJ-1025
- After I improved my 160/80M vertical, the RX antennas were no better than the vertical
- I also only have so much space – so need to try to keep the number antennas down on my .3 acre lot that only allows for antennas in a 20 x 70' area – to avoid negative interaction

20 Meters = *The Money Band*

DXCC Award	New LoTW QSLs	LoTW QSLs in Process	DXCC Credits Awarded	Total (All)	Total (Current)
Mixed *	0	0	337	337	332
CW *	0	0	316	316	313
Phone *	0	0	294	294	291
Digital	0	0	32	32	32
160M	0	0	62	62	62
80M *	0	0	171	171	169
40M *	0	0	270	270	267
30M *	0	0	250	250	248
20M *	0	0	310	310	307
17M *	0	0	255	255	252
15M *	0	0	237	237	233
12M *	0	0	178	178	177
10M *	0	0	186	186	185
6M	0	0	3	3	3
Challenge *	0	0	1903	---	1903
5-Band *	---	---	---	---	---
5-Band 17M *	---	---	---	---	---
5-Band 30M *	---	---	---	---	---
5-Band 12M *	---	---	---	---	---
Satellite	0	0	3	3	3

If I had to choose (only) one high band and one low band antenna, it would be a 20 and 40M mono bander. If I could only have one antenna, it would be a 40M mono bander.

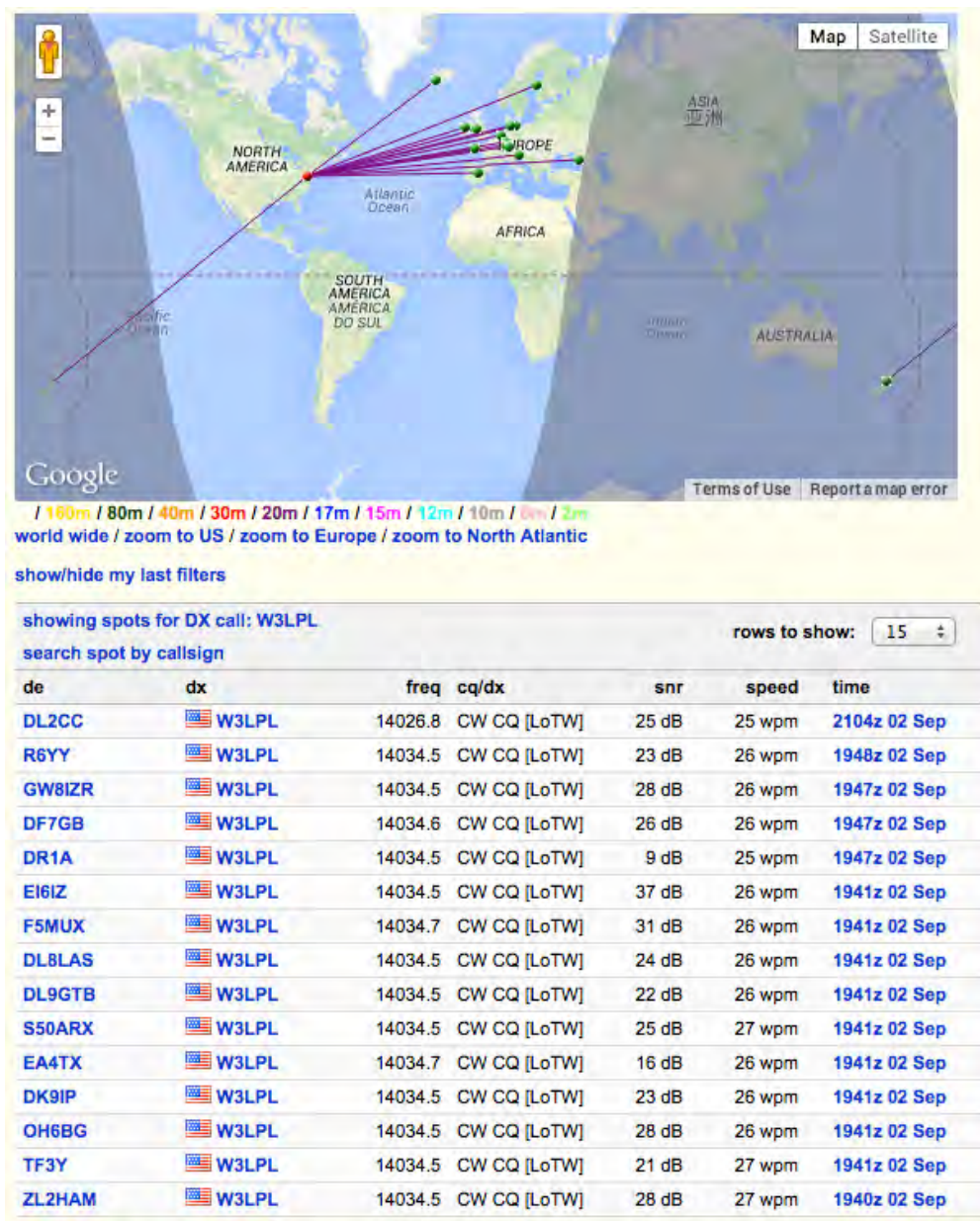
Moxon vs. Yagi



On the air, 3L yagi at 45' sure seems a lot better than Moxon at 55' . . . Did RBN "proxy tests" . . . (see next 2 slides for an explanation)

I compared my old nested 20 – 15M Moxon up 55' with a full sized 20M mono band yagi

Reverse Beacon Network



RBN “Proxy Test”

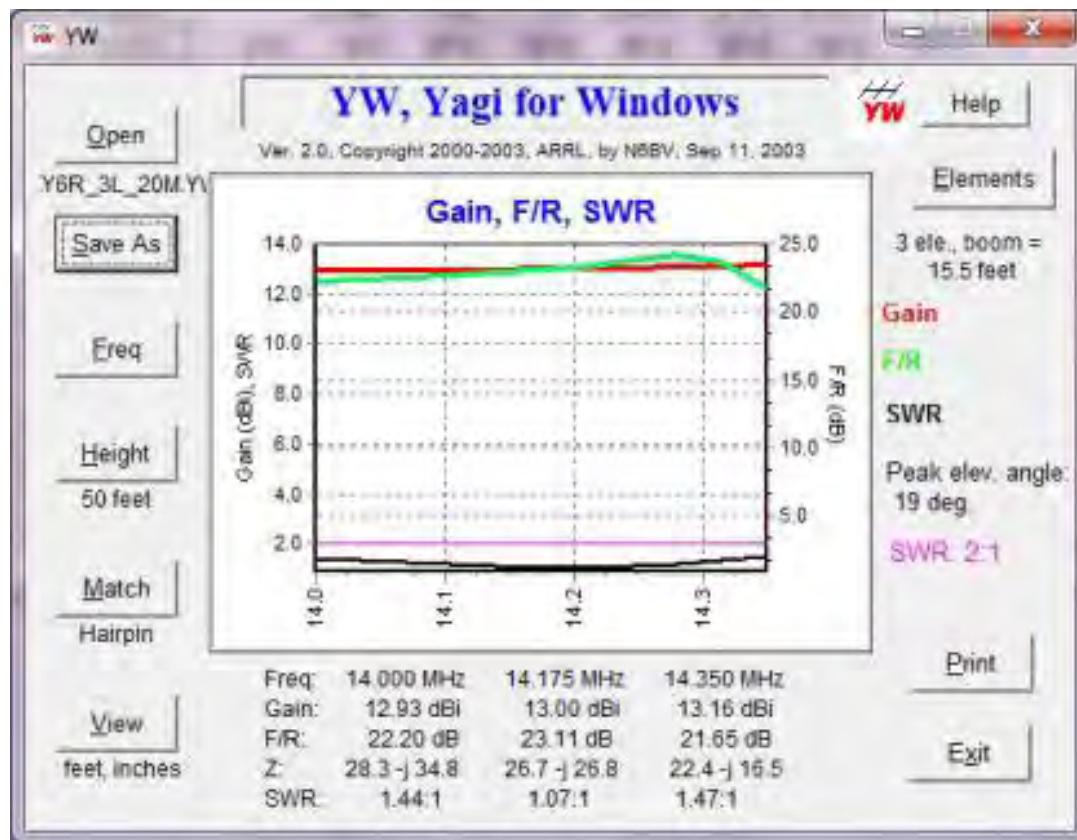
1. Write down the SSN and SFI
2. Test using Antenna A (i.e. 20-15M Moxon up 55')
3. Take down old AB-952 and put up new AB-577 with new 3L 20M Monoband Yagi
4. On a day where the SSN and SFI are the same as in step 1 – and at the same time of day, repeat the test

Most of the time I do straight A-B tests, but in the case of a tower at “Chez KY6R”, this is the best I could think of.

\$300 Worth of Aluminum → 8 Antennas!



My 20M 3L Monoband Yagi



Matching

☐ None ☒ Hairpin ☐ Gamma

Match frequency: 14.175 MHz

Driven-element tip: 26.5 inches

(Original tip length = 51.25 inches)

Feed-point Z: 26.7 - j 26.8 ohms

Cable Z0 impedance: 50 ohms

Hairpin rod diameter: 0.25 inches

Hairpin rod spacing: 6 inches

Hairpin inductance = 0.60 uH

Hairpin length = 15.22 inches

Compute Match

Cancel OK

YW – and the design is out of the ARRL Antenna Handbook. 13 dBi gain with 22 dB F/R. Uses a hairpin match.

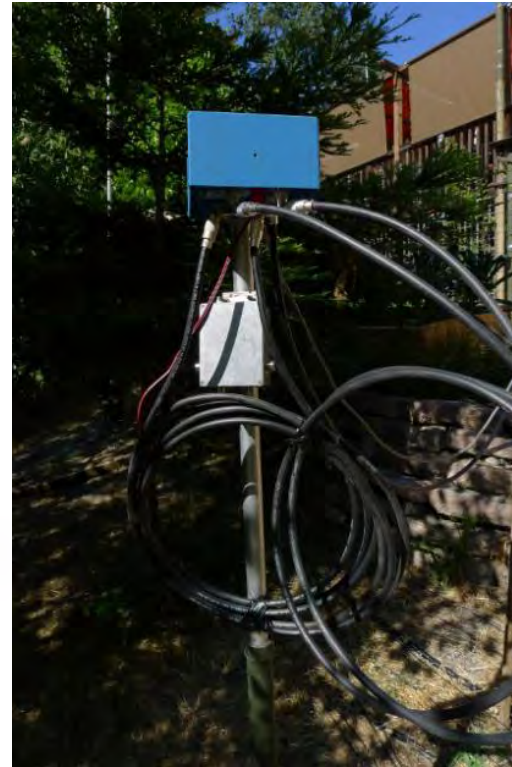
My 20M 3L Monoband Yagi

16' boom and full sized elements.

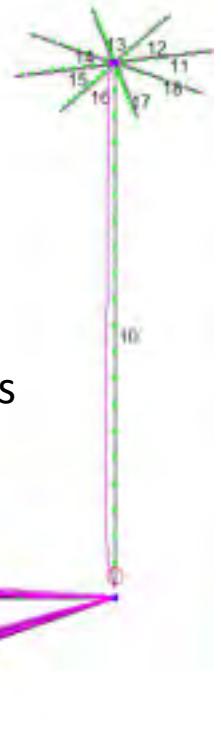


DXE Resin blocks and BEP plates

My 40M Phased Array



Christman Feed w/Array Solutions
Stackmatch II Switch



24' hatted verticals – also works on 30M

24 radials each w/screen

VA7ST Christman Feed Calculator

Christman Phasing Calculator

Operating frequency:
 Mhz

Coax velocity factor:
 Vf

Measuring your 71-degree phasing line

The **71-degree** phasing line should be: **23.061 ft** or **7.029 m**.

The 71-degree phasing line is 90 degrees at **9.063 Mhz**.

Cut the coax to the suggested length plus a few inches, in case your velocity factor is not quite right.

Leaving one end of the coax open, set your RF analyzer to **9.063 Mhz** and trim the coax until you see minimum Z impedance. You now have a length of 71 degrees at your desired operating frequency.

Measuring your 84-degree feedlines

Each **84-degree** feedline should be: **27.283 ft** or **8.316 m**.

The 84-degree feedlines are 90 degrees long at **7.661 Mhz**.

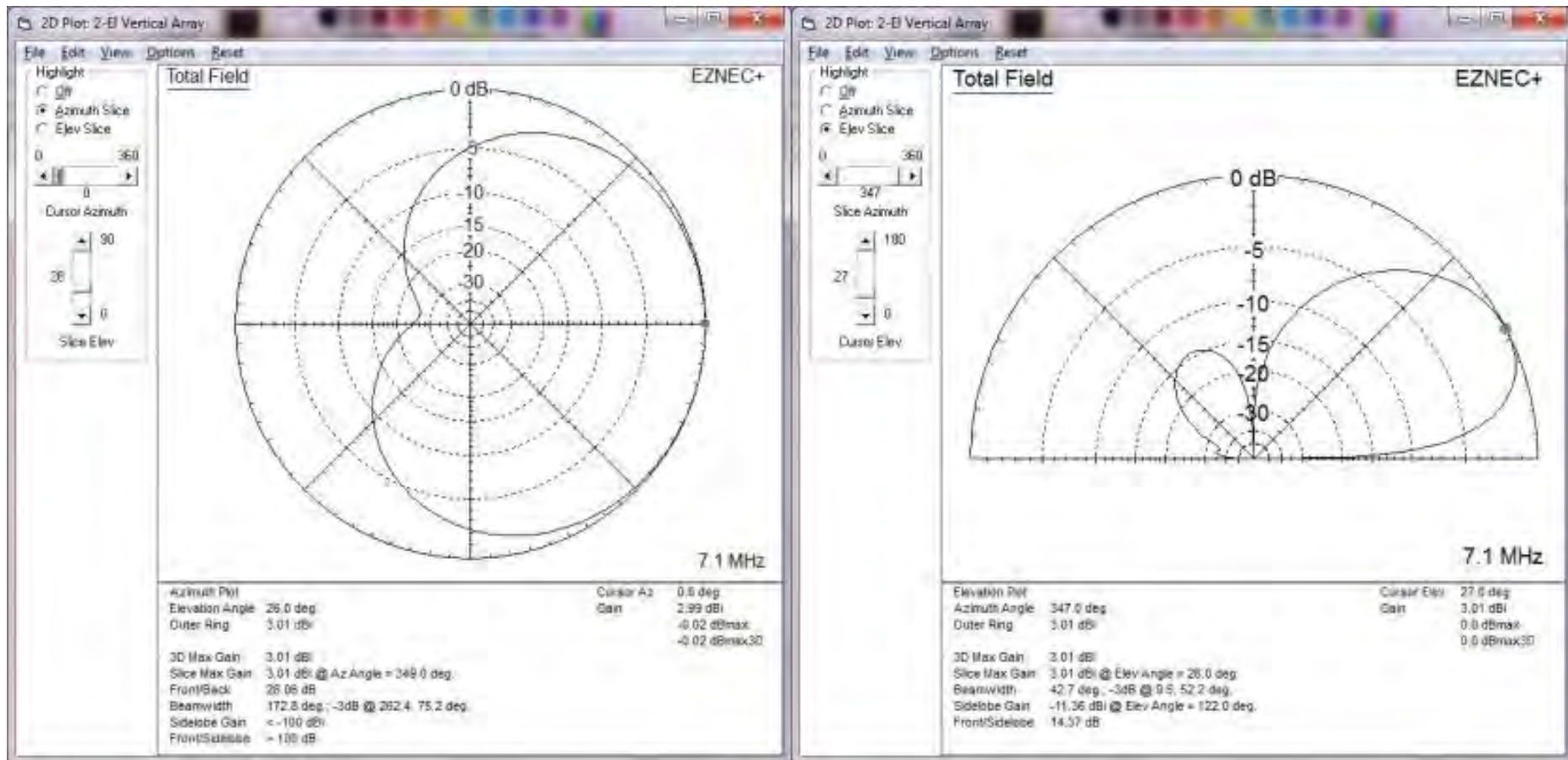
Cut the coax to the suggested length plus a few inches, in case your velocity factor is not quite right.

Leaving one end of the coax open, set your RF analyzer to **7.661 Mhz** and trim the coax until you see minimum Z impedance. You now have a length of 84 degrees at your desired operating frequency.



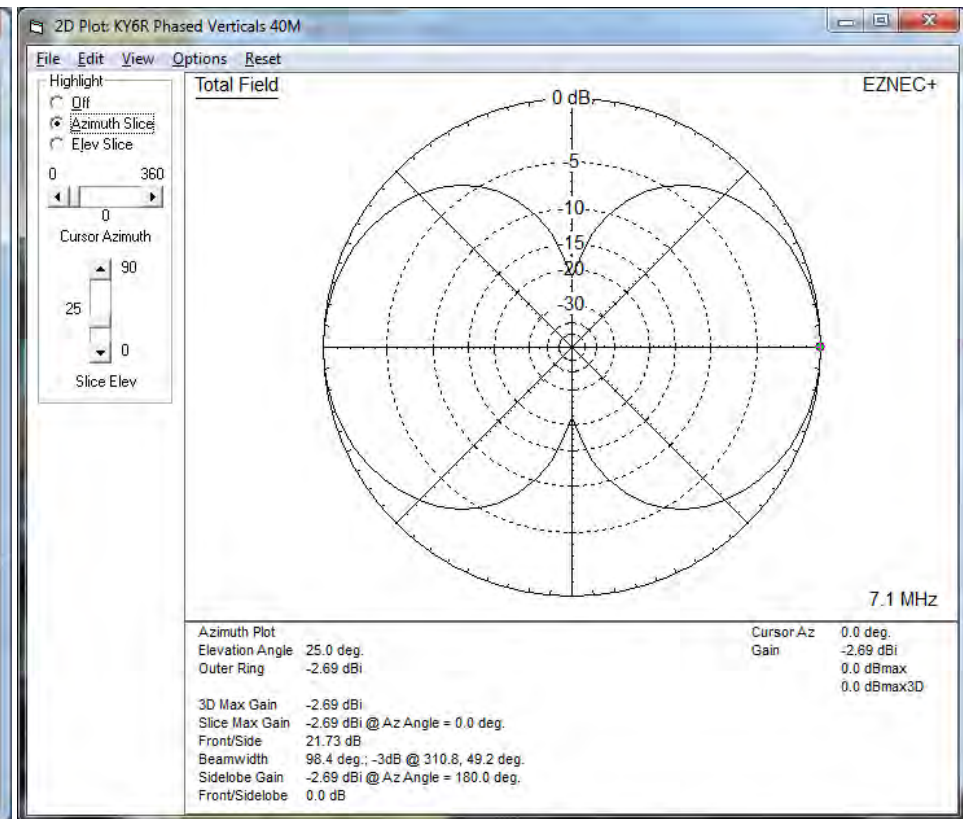
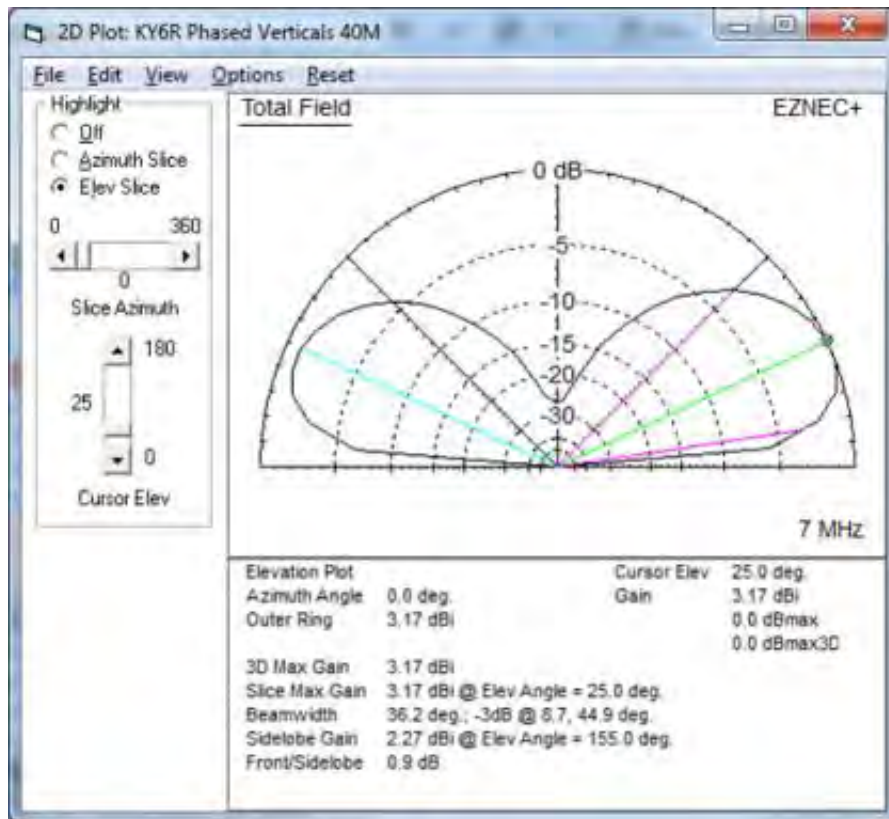
Cut coax with open end until at the freq listed in the calculator, you hit X=0
My LMR-400 has a vf of 85

EZNec Models – End Fire



“Textbook says” 4.1 dBi End Fire in the NE and SW directions

EZNec Model – Broadside (NW – SE)



“Textbook says” 3 dBi broadside

40M Phased Array vs. Dipole Up 55'

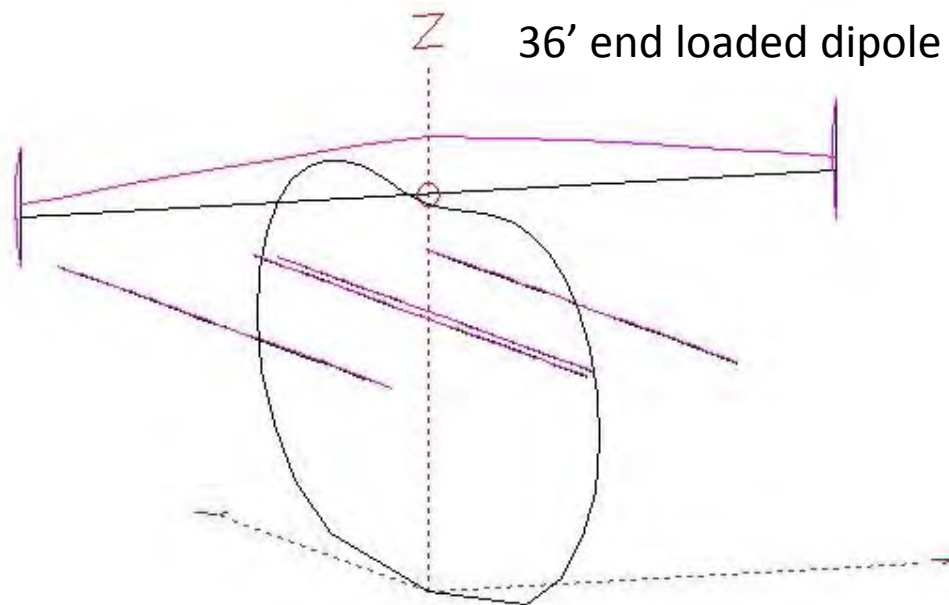
Here is my phased vertical array:

DEGREES	GAIN(dBi)	“Textbook”
15	1.94	3.0
20	2.71	3.8
25	2.95	4.1
35	2.65	3.7

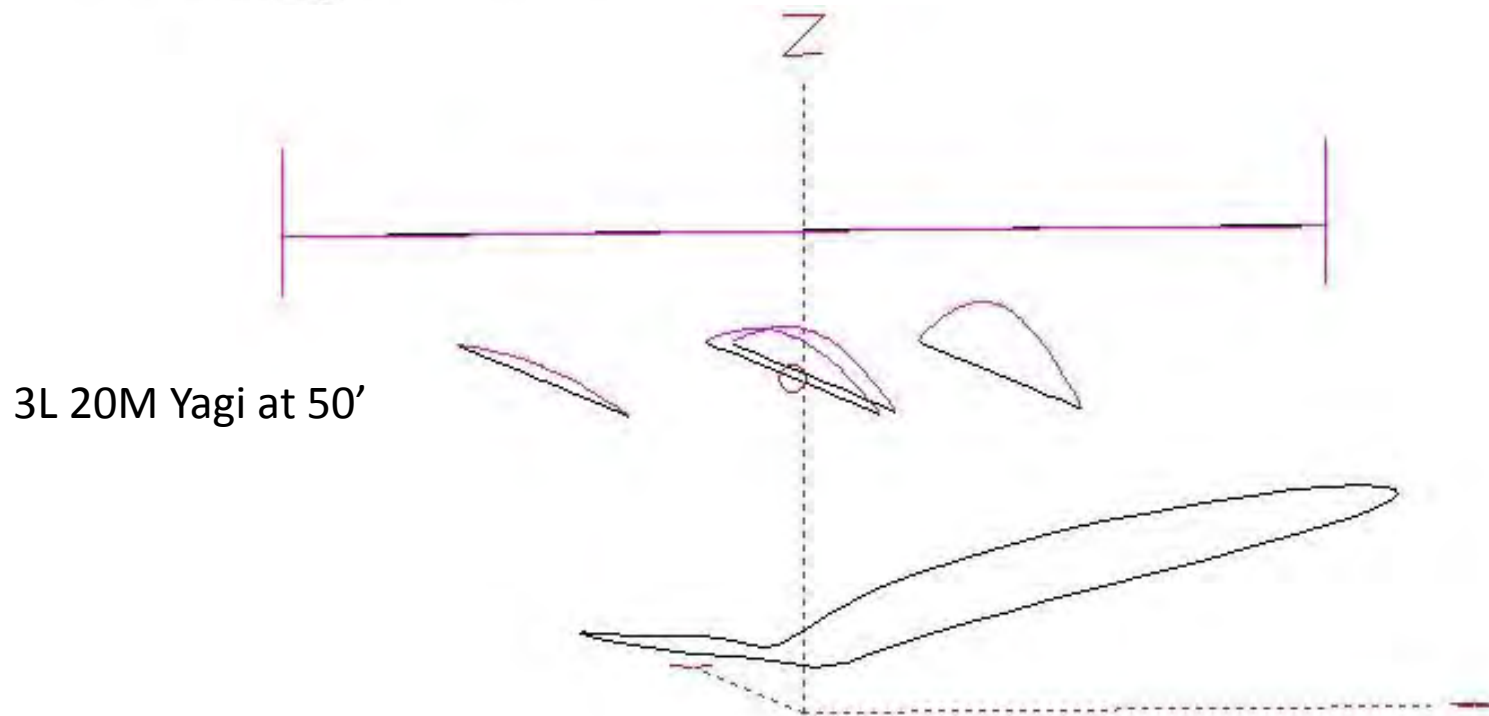
And now – if I were to put a 40M rotatable dipole up above my 20M 3L yagi at 55':

DEGREES	GAIN(dBi)	At 70'	On 30M
15	2.83	4.1	6.86
20	4.61	6.0	7.34
25	5.68	7.15	6.58
35	6.46	8.0	.95

The rotatable dipole at 70' is a really good antenna. At low angles, the phased array is similar To a rotatable dipole at 55' – which is actually pretty low for 40M.



40M Dipole at 55'

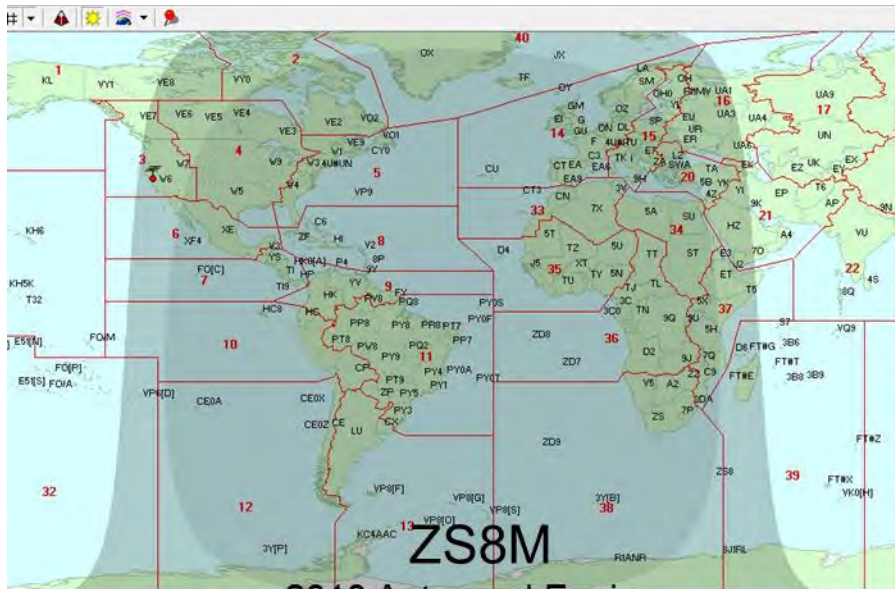


20M Yagi Up 55'

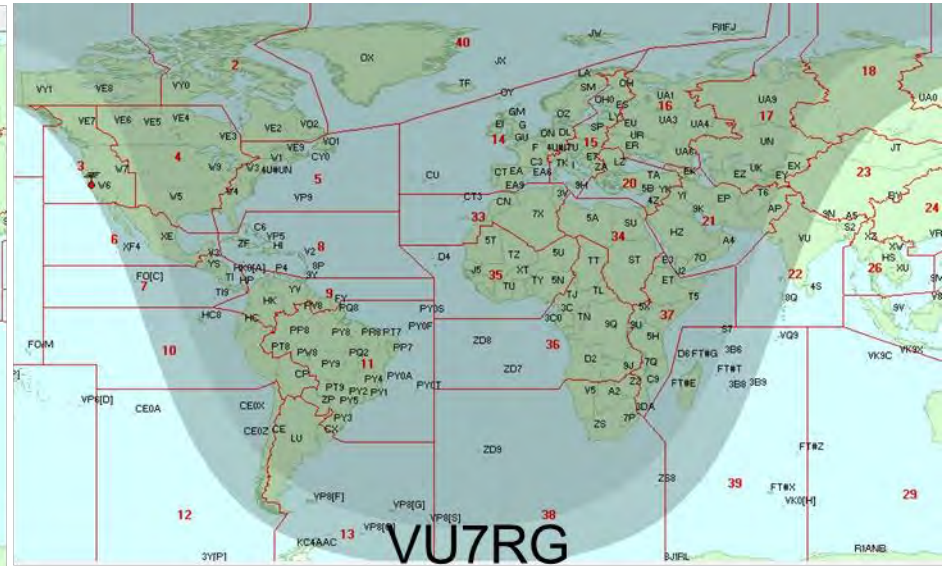
- Works quite well on 30M and 17M
- Can use as a very short 40M dipole on 40M
- Did not want to stack anything on top
- AB-577 stands perfectly level – no leaning with all guy ropes loose



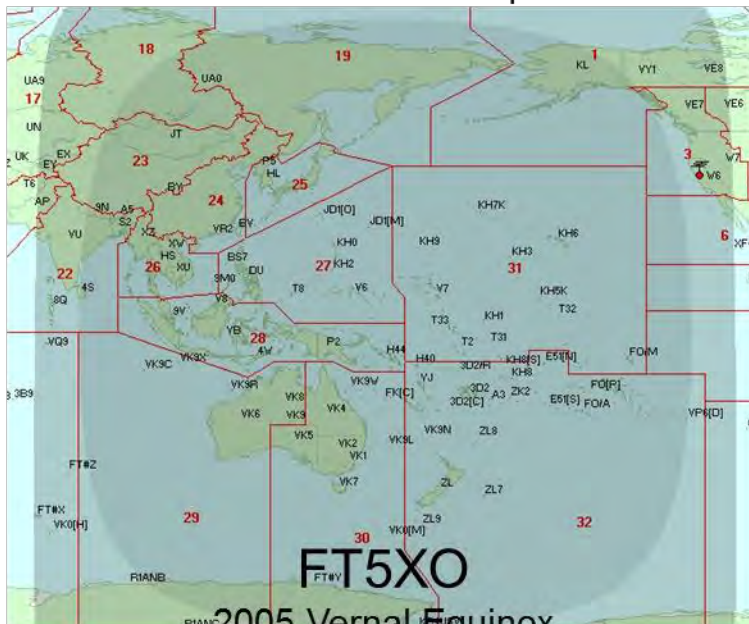
40M Greyline = My Favorite DX



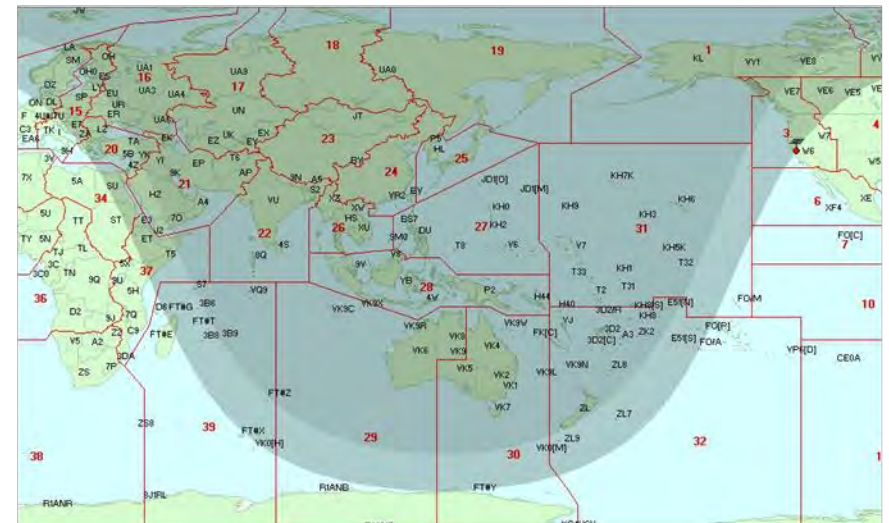
2010 Autumnal Equinox



2007 January



2005 Vernal Equinox



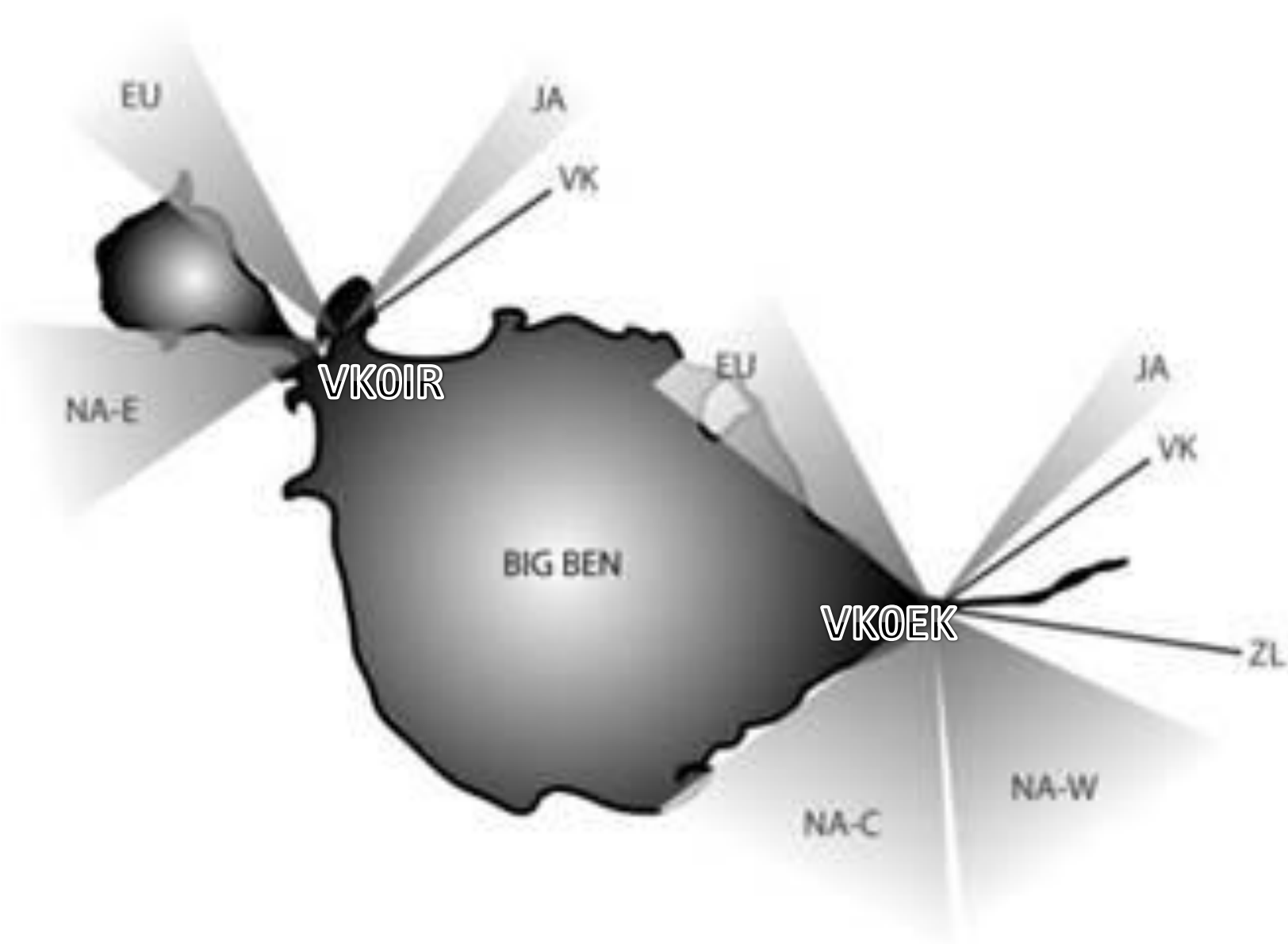
TO4E
2003 - December

VKOEK

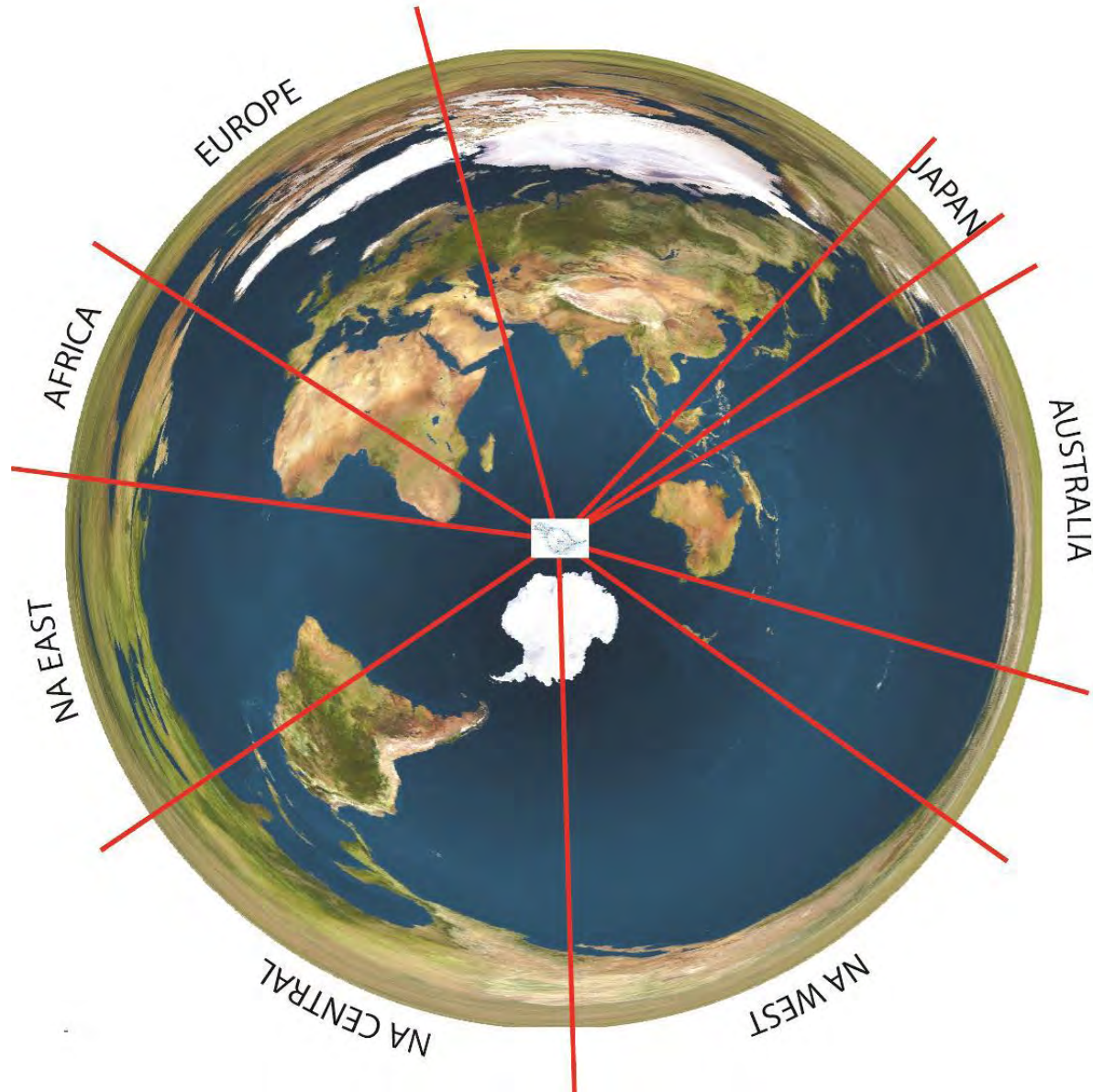


Photo: L.E. Large AAD © CoFA

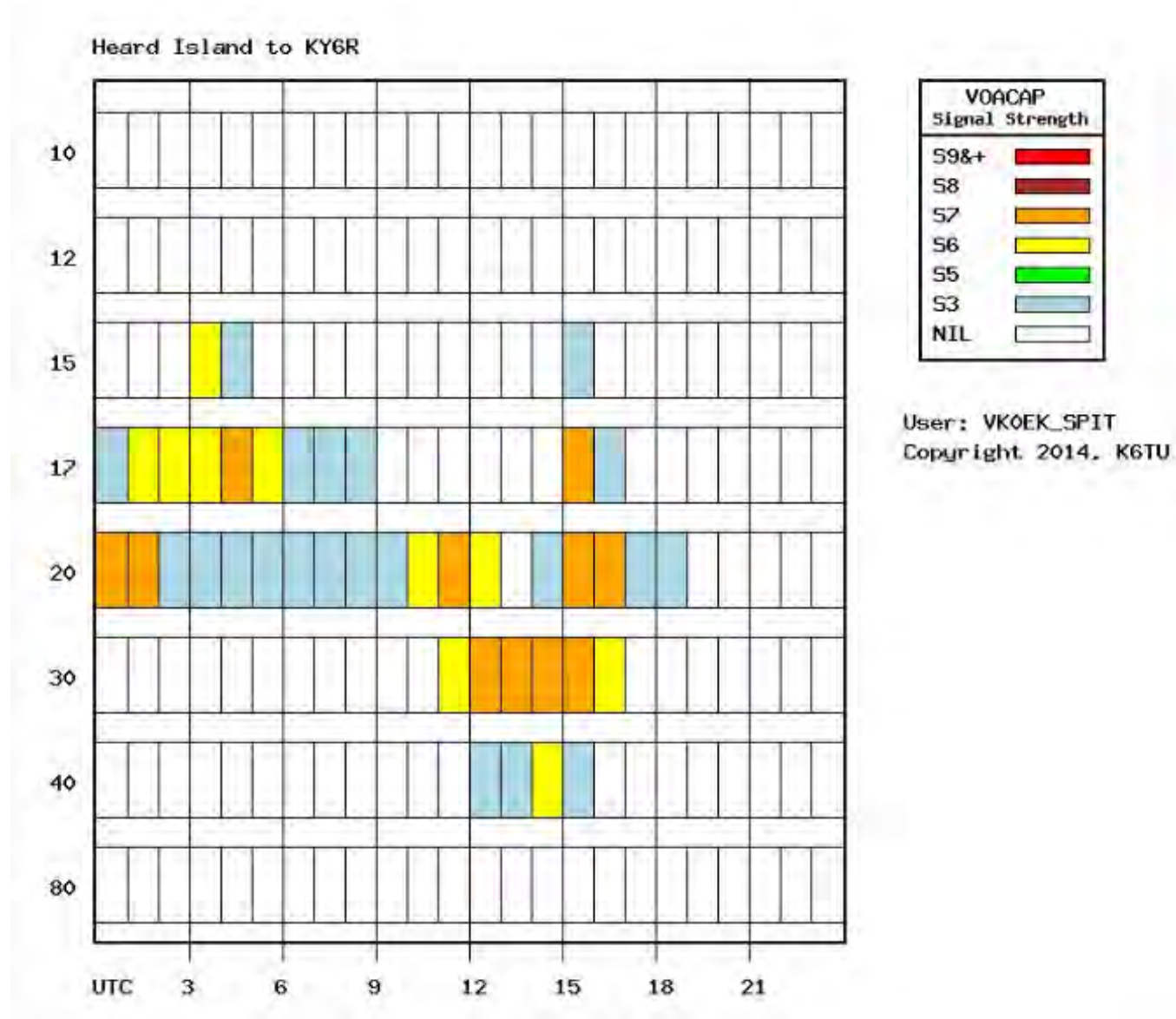
From VK0EK to KY6R = 138°



Azimuthal Equidistant Map



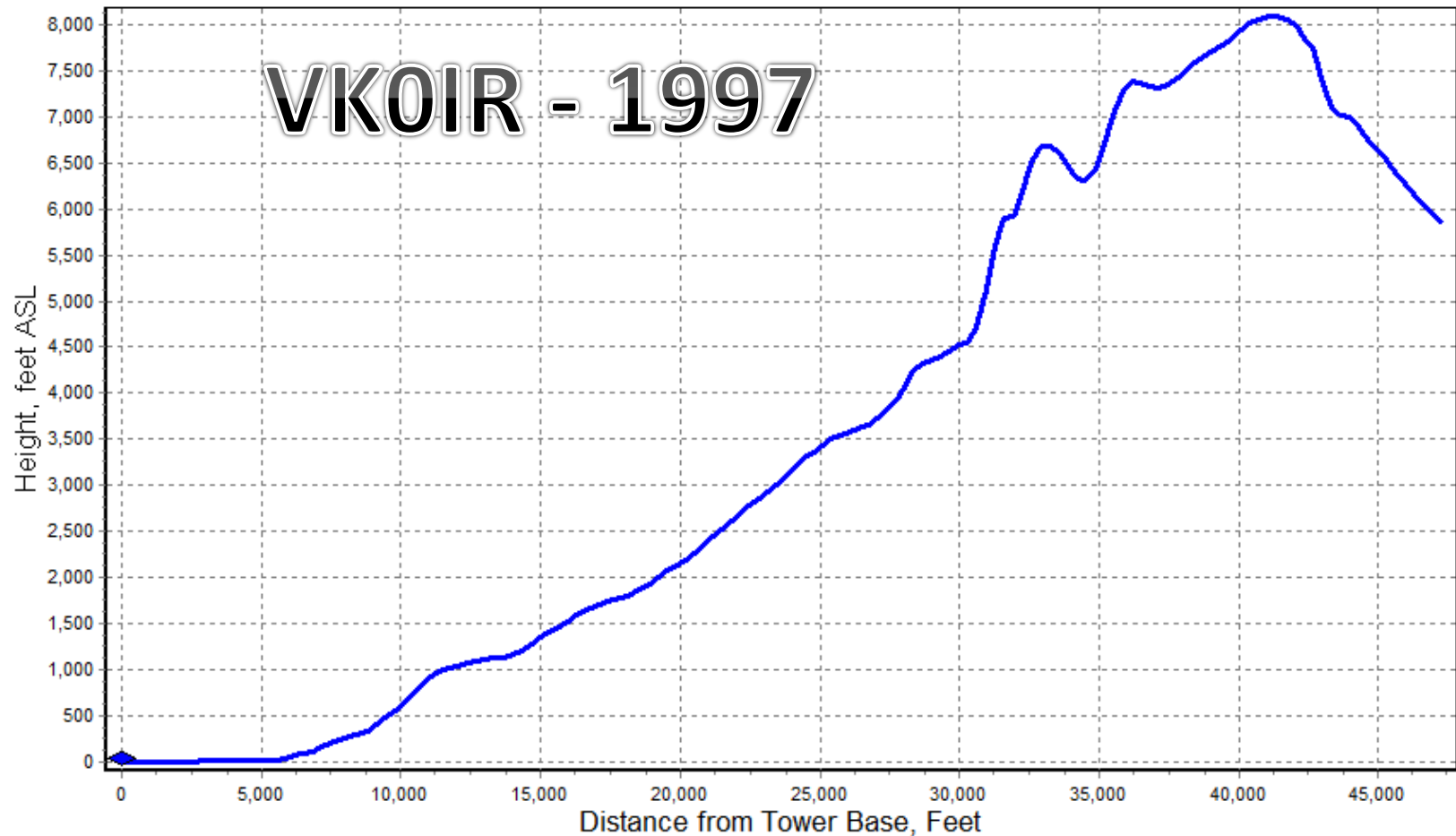
Heard Island - November 2015



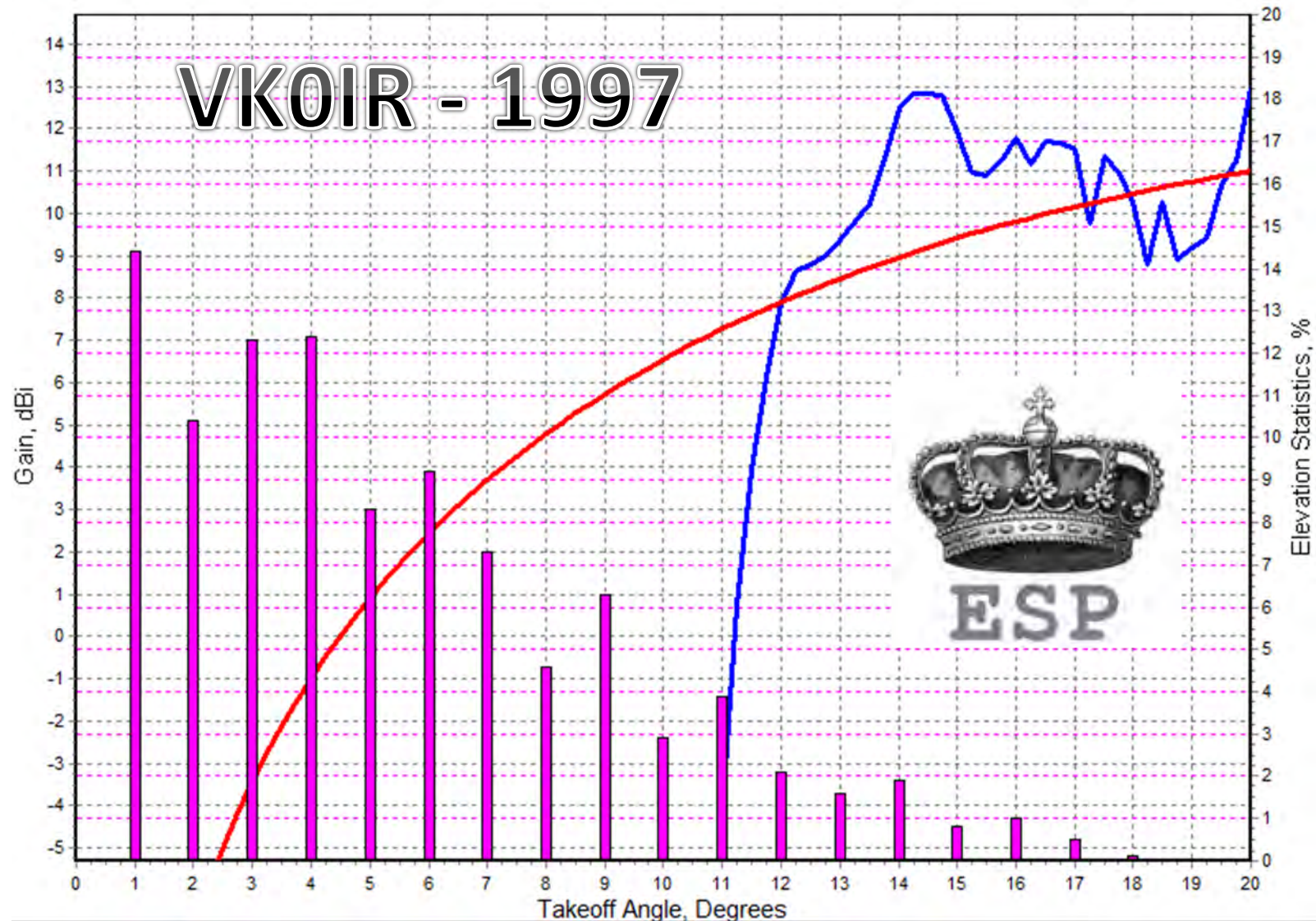
Spit and Atlas show the same “general” propagation, but they differ when you look at the details

From “Atlas Cove” to KY6R = 138°

Terrain Profile

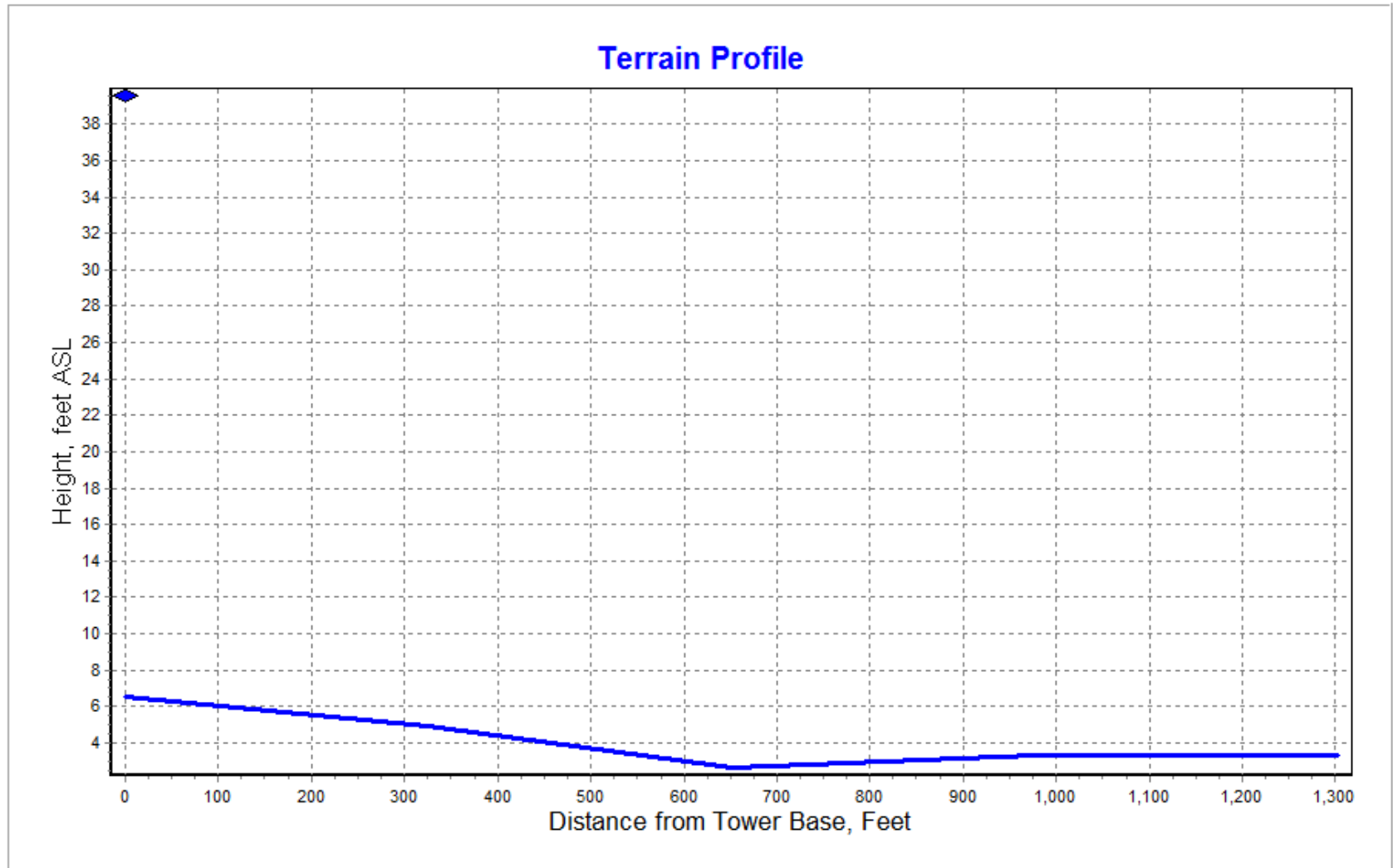


From “Atlas Cove” to KY6R = 138°

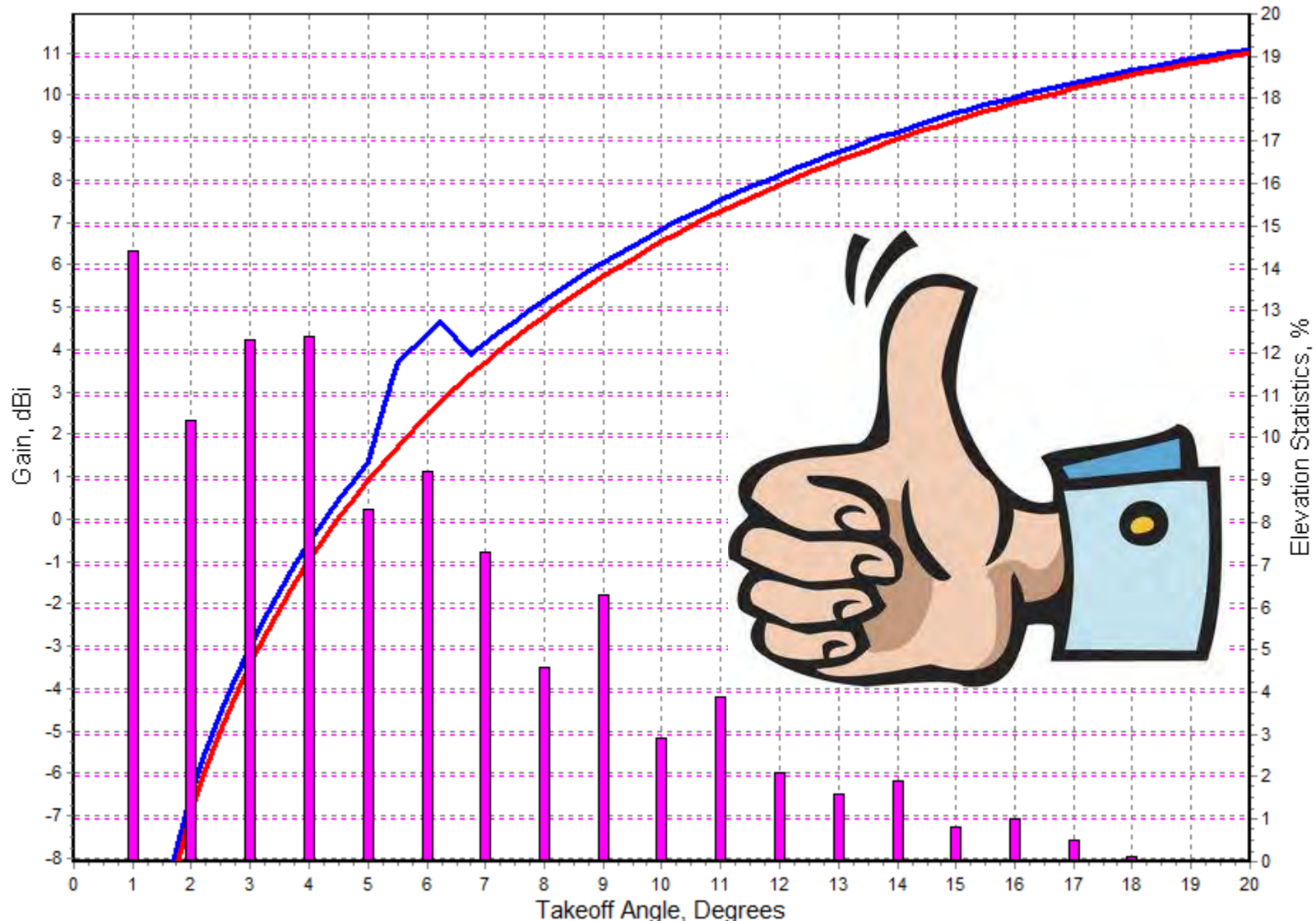


HFTA Data and Analysis provided by Dean Straw, N6BV

From “Spit Point” to KY6R = 138⁰

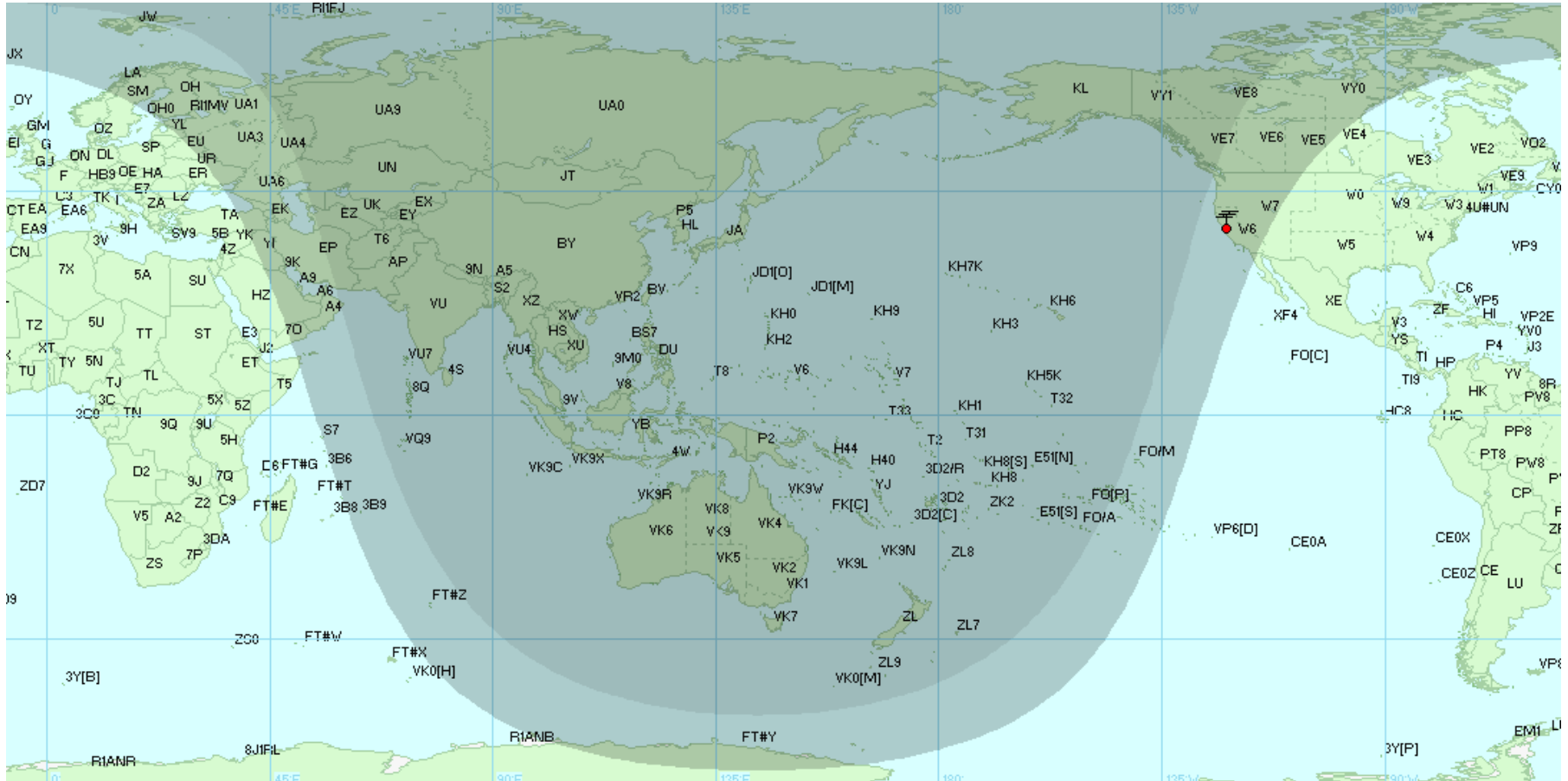


From “Spit Point” to KY6R = 138°



HFTA Data and Analysis provided by Dean Straw, N6BV

Grey Line - Morning

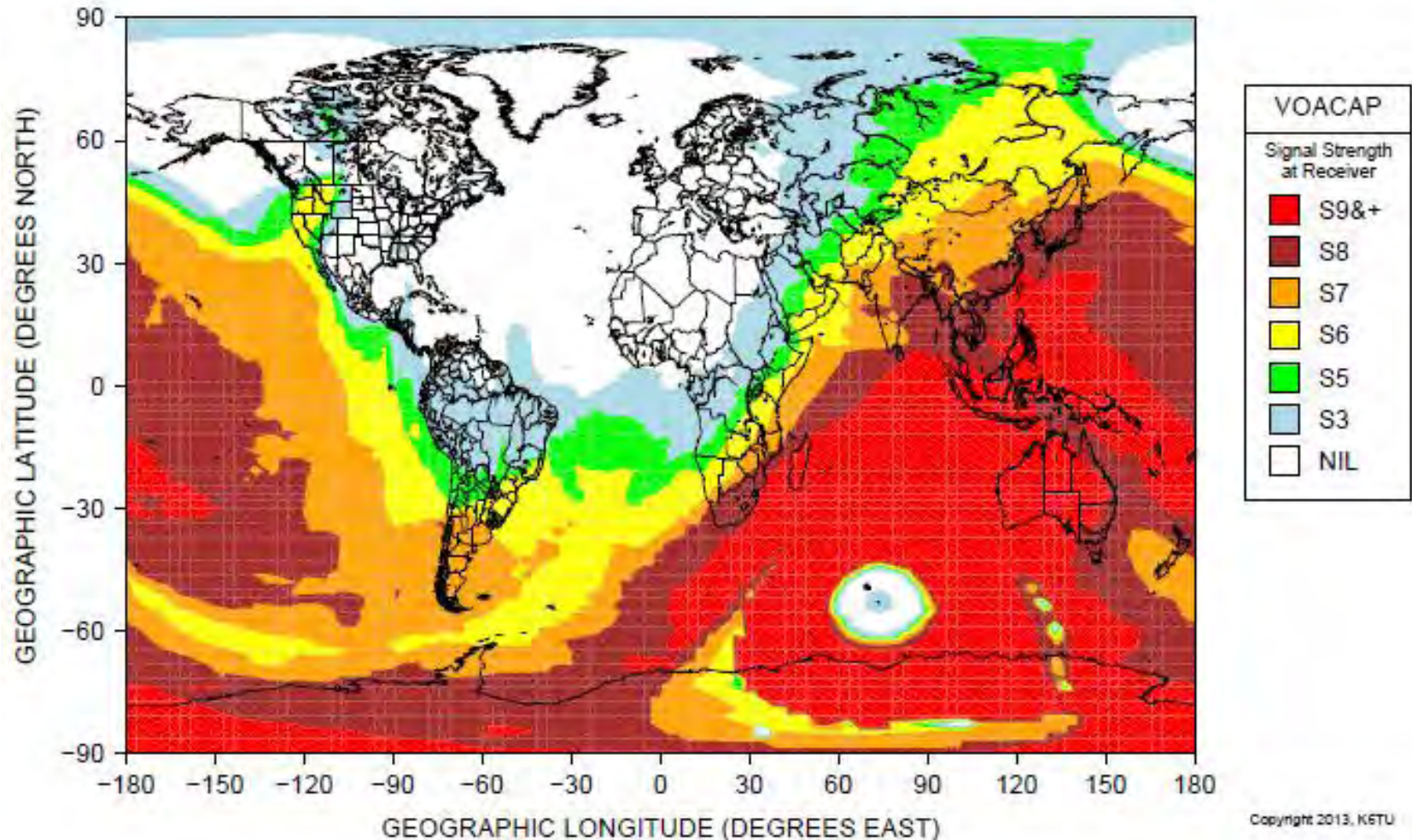


Going in November does help the West Coast

Propagation – 20M - Spit

20M: 11 utc Nov 44ssn

Prepared for: VK0EK

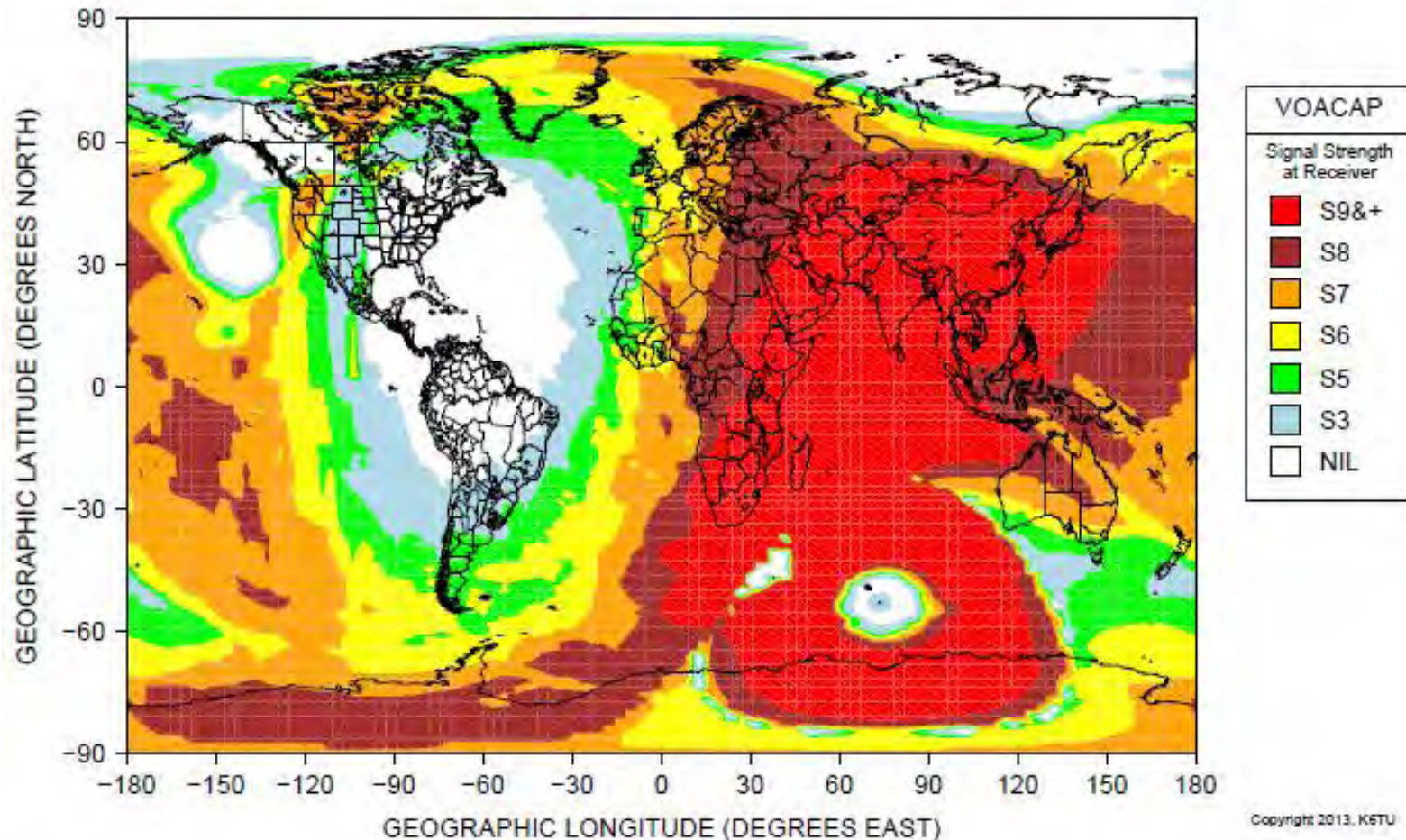


Super secret early morning 20M opening. I heard this path during FT5ZM.

More 20M

20M: 15 utc Nov 44ssn

Prepared for: VKDEK

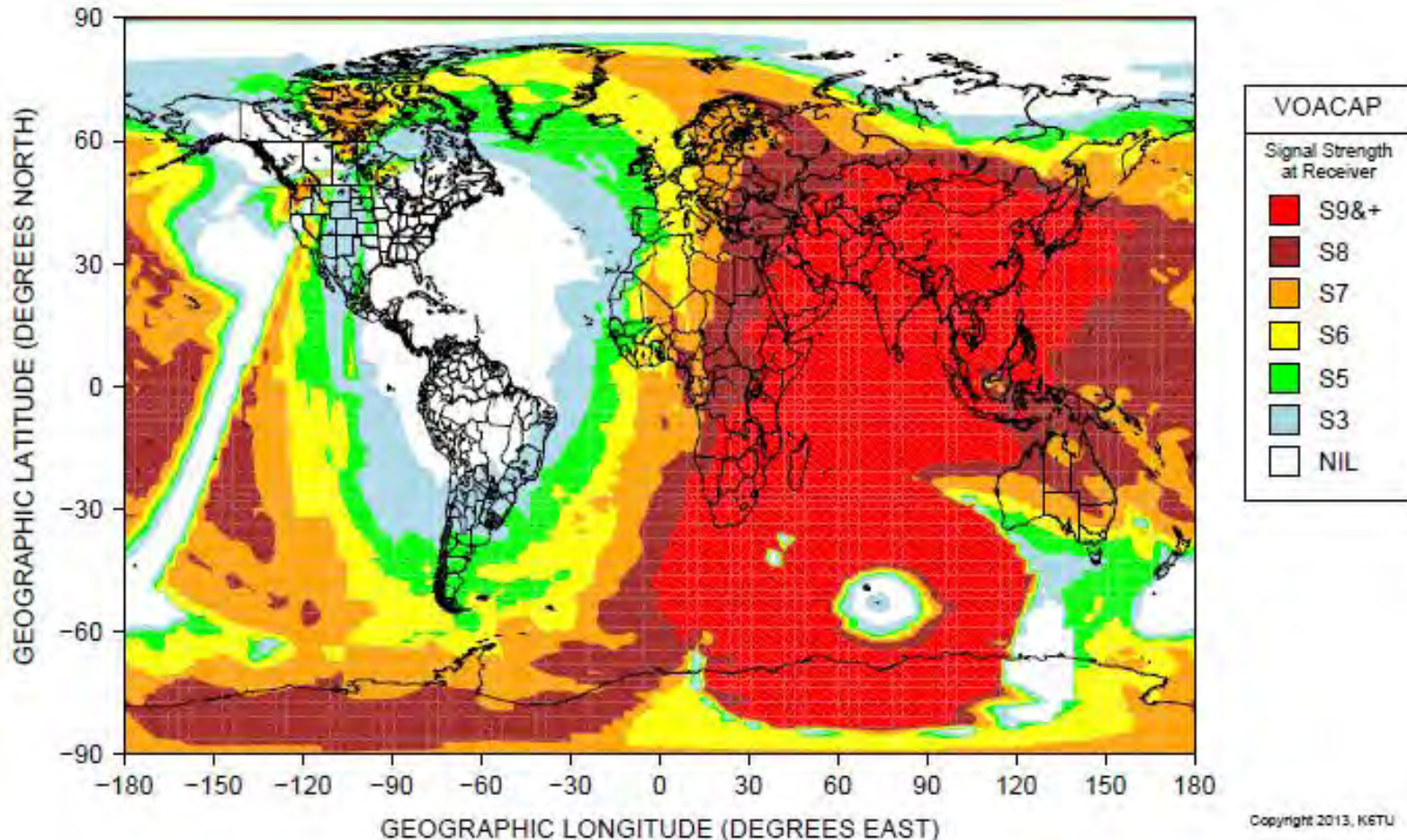


Stronger – but much more competition

20M Atlas

20M: 15 utc Nov 44ssn

Prepared for: VKDEK

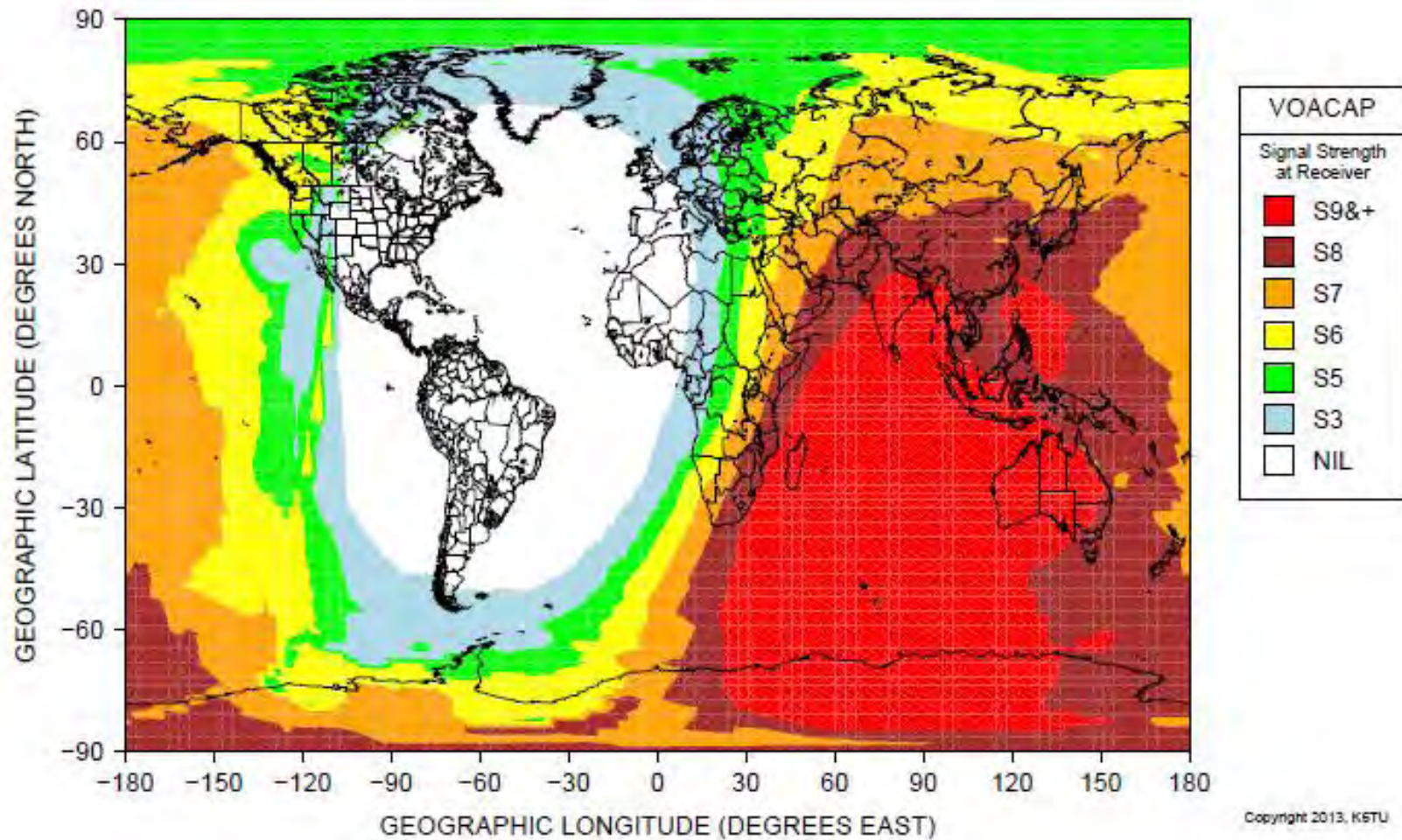


Big Ben really cuts propagation off to West Coast – especially SF Bay Area!

30M - Spit

30M: 14 utc Nov 44ssn

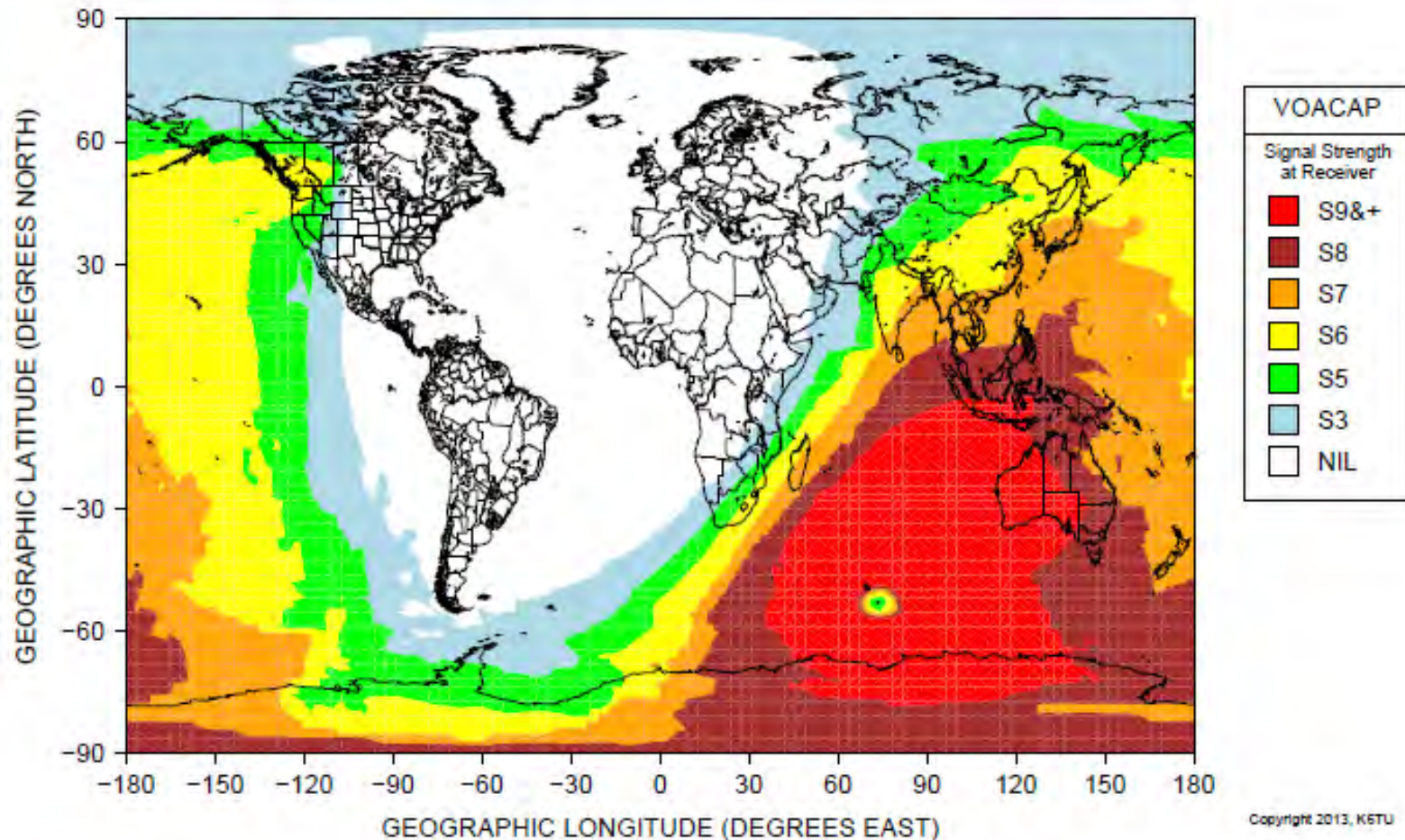
Prepared for: VKDEK



30M - Atlas

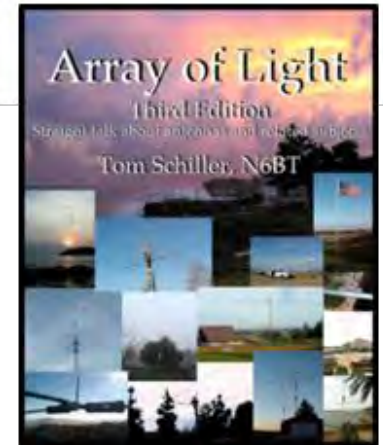
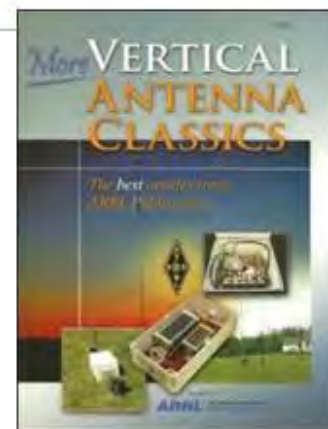
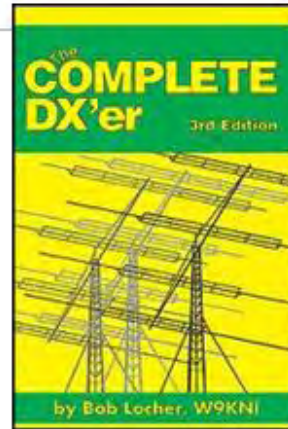
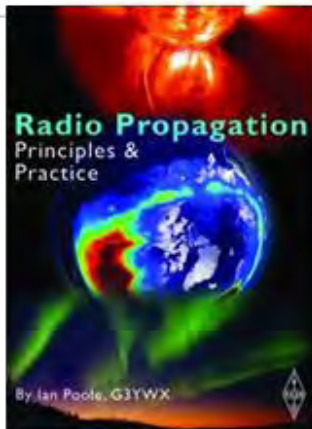
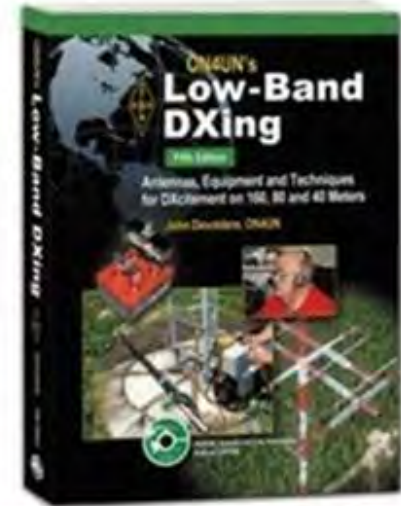
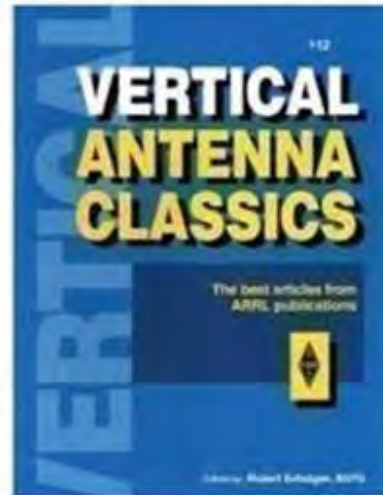
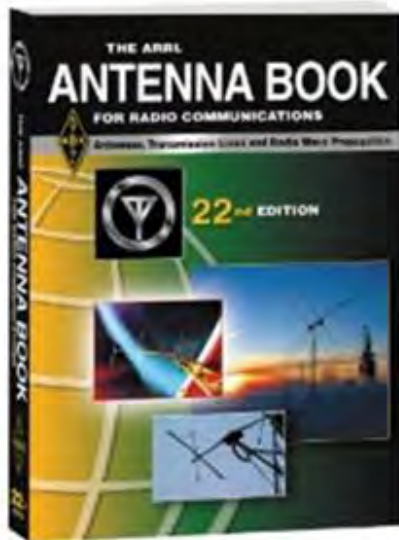
30M: 12 utc Nov 44ssn

Prepared for: VKDEK



30M doesn't suffer as bad as 20M from Big Ben . . .

Great Books





Visit VKØEK.ORG for up to date information and news . . .